United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Regents of the University of California (Agricultural Experiment Station)

Soil Survey of Stanislaus County, California, Northern Part

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

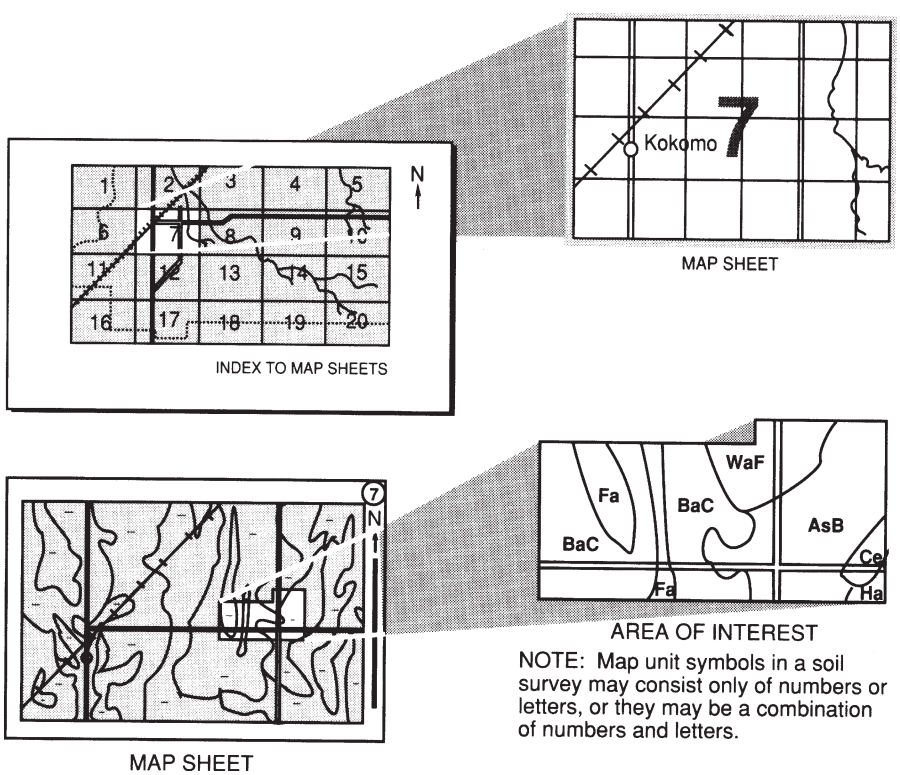
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service and the Regents of the University of California (Agricultural Experiment Station). The survey is part of the technical assistance furnished to the East Stanislaus County Resource Conservation District and San Joaquin Valley Resource Conservation and Development Area.

Major fieldwork for this soil survey was completed in 2005. Soil names and descriptions were approved in 2006. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2005. The most current official data are available on the Internet.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The correct citation for this survey is as follows:

United States Department of Agriculture, Natural Resources Conservation Service. 2007. Soil survey of Stanislaus County, California, Northern Part. http://soils.usda.gov/.

Cover: View looking east across part of the survey area. The Gopher Ridge Formation is in the background.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Issued 2007

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Lincoln E. Burton
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Soil Survey of Stanislaus County, California, Northern Part

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United States Department of Agriculture,
Natural Resources Conservation Service,
in cooperation with
the Regents of the University of California
(Agricultural Experiment Station)

This soil survey area includes the northern part of Stanislaus County (fig. 1). It encompasses an area of approximately 109,024 acres (43,610 hectares). It is bordered on the south by the Stanislaus River, on the west by San Joaquin County, and on the northeast by Calaveras County.

The lowest elevation in the survey area is approximately 99 feet (30 meters), at the intersection of the San Joaquin County boundary and the Stanislaus River near Oakdale in the southwestern part of the survey area. The highest elevation is approximately 800 feet (245 meters), on the Calaveras County boundary north of Knights Ferry.

Previous soil survey work in the northern part of Stanislaus County includes "Reconnaissance Soil Survey of the Middle San Joaquin Valley, California" (USDA–BOS, 1919), "Soil Survey of the Stockton Area, California" (Retzer, 1951), "Soil survey of the Eastern Stanislaus Area, California" (Arkley, 1959), and "Soil survey of the Eastern Stanislaus Area, California" (Arkley, 1964). The current survey provides soil survey information for the northern part of Stanislaus County and includes additional information and interpretations not included in the prior surveys.

General Nature of the Survey Area

This section provides general information about the northern part of Stanislaus County, California. It describes history and development; water supply; agriculture; physiography, relief, and drainage; and climate.

History and Development

Little information is available about the survey area prior to 1840. Records show that American Indians inhabited the area and that game, cattle, and wild horses were plentiful. The Mexicans who arrived in the area later focused on ranching. The settlers who homesteaded the area in the 1840s also initially engaged in ranching. The production of agricultural commodities spiked with the rapid influx of gold miners.

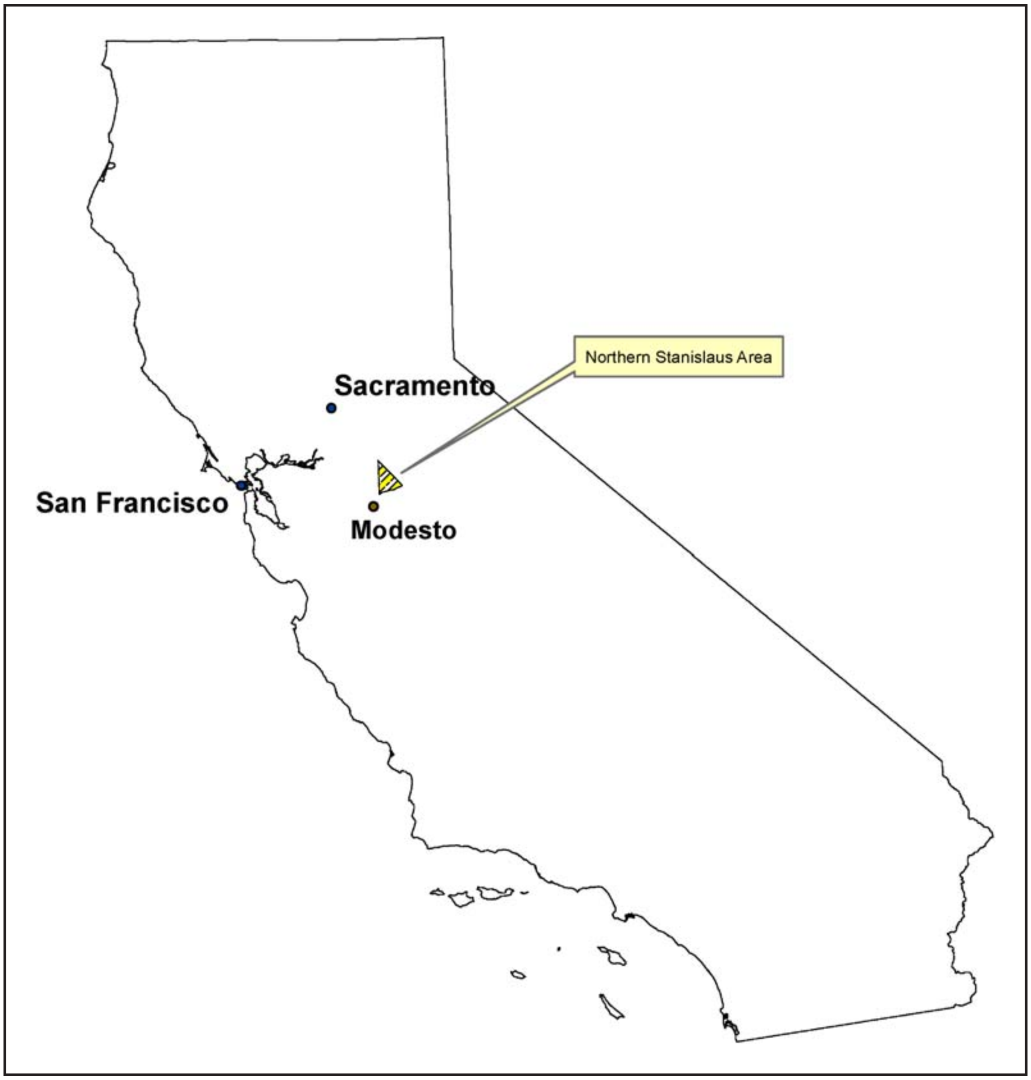

Figure 1.—Location of Stanislaus County, Northern Part, in California.

Fortune seekers passed through the area on their way to gold mines in the western metamorphic belt region of the Sierra Nevada Mountains. The creeks and rivers throughout the area were rich with beaver, and trapping was a thriving business.

At the beginning of the twentieth century, the southwestern corner of the survey area entered a growth period due to the railroad facilities and the introduction of irrigation. Gold miners turned to farming because of high profits, a long growing season, and productive soils. In areas used for livestock grazing, windmills and ponds provided water for livestock. Intensive pumping of ground water allowed expansion of irrigated agriculture. Gasoline engines in the early 1900s and electric motors in the 1920s were used to pump the ground water. Irrigation districts were formed, and improved technology expanded the extent of land used for irrigated pasture, corn, vineyards, and orchards.

Water Supply

The water supply in the northern part of Stanislaus County supports multiple uses. It comes from rivers passing through the survey area, creeks whose

watersheds originate within the area, wells tapping into underground streams moving though the area, and aquifers storing water under the area.

The Stanislaus and Calaveras Rivers pass through the survey area. Both have upstream dams and reservoirs to help control flooding and to track delivery of water where needed during the spring, summer, and fall. Most of the irrigation water comes from these two rivers. The quality of the water is high. The water comes from rain and snowmelt in the Sierra Nevada Mountains.

Water from creeks that drain local watersheds is important for ranching operations. The four major creeks that drain rainwater in the survey area are Duck, Rock, Hoods, and Littlejohns Creeks. Just to the west of the border with San Joaquin County, all four creeks empty into the Farmington Flood Control Basin (fig. 2), which was completed in 1951. Simmons Creek is controlled by Woodward Dam, and the reservoir is supplied with water from the Stanislaus River through the South San Joaquin Main Canal. Both of these water storage facilities are located in an area surrounded by long narrow hills that have soils whose parent materials are derived from the weathering of andesitic, tuffaceous sandstone. The ridgetops of these long, narrow hills are commonly capped with soils that have a claypan or hardpan. These soil layers resist weathering. The hills adjacent to the creeks, therefore, tend to be quite steep, especially in the lower reaches of the creeks. The weather-resistant soil layers dictate local landforms that are conducive for storing water. Much of the runoff is captured in ponds throughout the rangeland in the survey area.

The supply of water to the survey area from underground sources dwindles as the depth to the surface of the aquifer increases. Differences in pumping patterns vary greatly between the cropland underlain by alluvium and the rangeland underlain mostly by paralithic bedrock. As the water table drops, the cost of pumping water to the surface using electricity increases.

Figure 2.—Farmington Flood Control Basin in March of 2007. The brown vegetation shows the extent of the floodwater held in January of 2005.

Agriculture

The southwestern corner of the survey area includes about one third of the total acreage and is underlain by alluvium (fig. 3). Most of the soils forming in alluvium are deep. They make up about 36,000 acres and are used for irrigated crops or pasture. The northeastern two thirds of the survey area is underlain by paralithic bedrock. Most of the soils forming in parent material derived from the weathering of paralithic bedrock are shallow. They make up about 74,000 acres and are primarily used for rangeland, dryland pasture, or wildlife habitat.

Fruits, nuts, vegetables, and field crops are the most dependable and successful agricultural ventures in the survey area, and livestock and poultry are close competitors. The acreage devoted to agriculture in the area north of Oakdale has gradually declined in recent years and is expected to continue declining in the near future due to rapid urbanization.

Physiography, Relief, and Drainage

The survey area can be divided into two major physiographic regions: the San Joaquin Valley in the southwestern third and Sierra Nevada foothills in the northeastern two thirds.

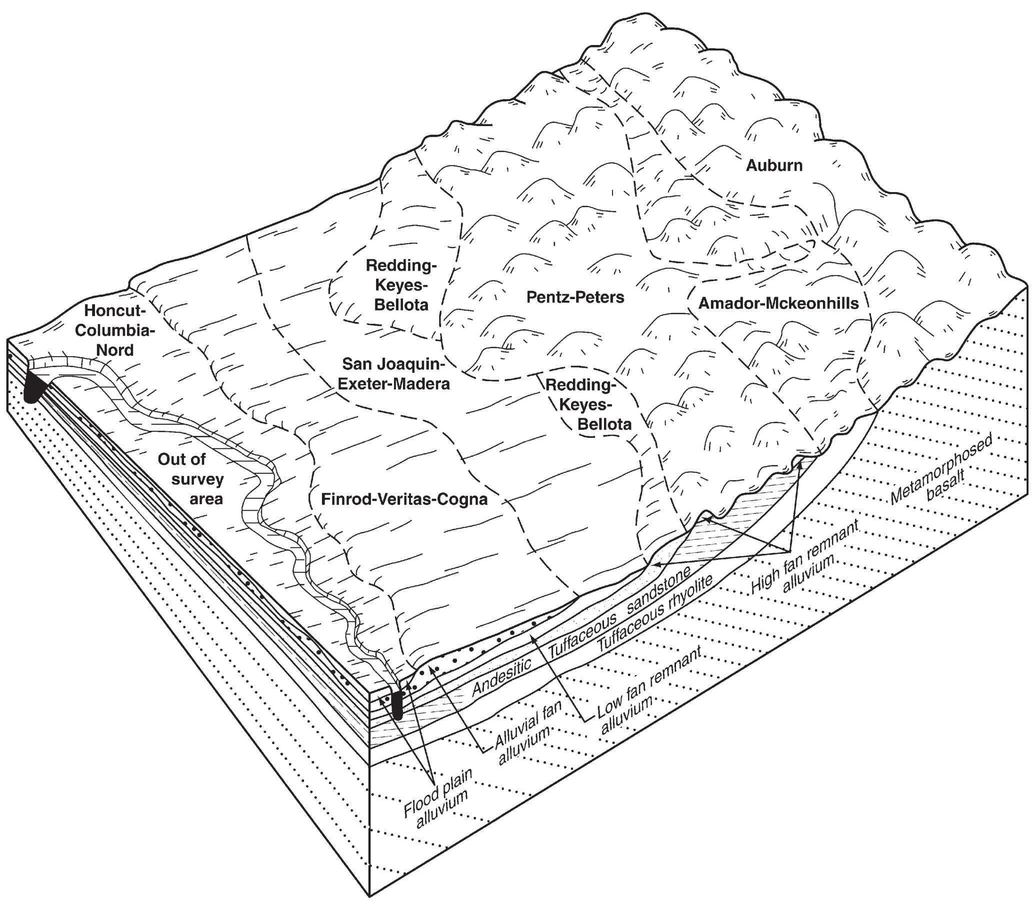

Figure 3.—Typical pattern of soils and parent materials on the eastern side of the San Joaquin Valley and in the low hills of the metamorphic belt region of the Sierra Nevada Mountains. Consolidated parent materials are in the hills (Konigsmark, 2002).

The San Joaquin Valley is underlain by alluvium. The landscape is a valley. The dominant landforms are flood plains, stream terraces, backswamps, alluvial fans, and fan remnants. Except for the fan remnants, which are rolling and undulating, most of the areas used as cropland are nearly level. Elevation in the cropland area ranges from about 100 to 200 feet. The flood plains along the Stanislaus and Calaveras Rivers and backswamps along the creeks remain subject to flooding and deposition despite upstream reservoirs and a myriad of ponds.

An ancestral Stanislaus River did not cut a deep canyon through the survey area as the current river now does. Five million years ago, before the initial Sierra Nevada Mountain uplift began, the river broke into several smaller streams near Knights Ferry, cutting and splaying deposits across the breadth of a large alluvial fan. As mountain building proceeded, portions of the alluvial fan became so highly uplifted that they were no longer subject to flooding. These areas are now fan remnants. Some are in higher positions, and some are in lower positions. The higher remnants have been subjected to longer term erosive forces and are, therefore, more deeply dissected. They illustrate a more pronounced degree of undulation. Claypans (argillic horizons) and hardpans (duripans) are common in the soils of fan remnants.

The alluvium is from mixed rock sources, but the dominant materials are granitoid. The measurable dominance in granitoid materials is a function of the geology in the high Sierras. Granitoid batholiths are at the surface in the Sierra Nevada Mountains. As elevation increases, the weather becomes increasingly powerful, stripping granitoid detritus into the streams.

The Sierra Nevada foothills are underlain mostly by paralithic bedrock but are underlain in some areas by lithic bedrock. The landscape consists of hills, and the landforms are hillslopes. The total variation in elevation throughout the rangeland area is about 200 to 800 feet. From hilltop to bottom of the closest gently sloping drainageway, the change in elevation ranges from 50 to 200 feet. Within an area having uniform parent material, differences between map units are commonly based on differences in slope, which generally conforms to certain elevation ranges. For example, in one area where the parent material is residuum derived from the weathering of andesitic, tuffaceous sandstone, the part of the area at an elevation of 50 to 100 feet has a slope of 5 to 15 percent and constitutes on map unit and the part of the area at an elevation of 100 to 200 feet has a slope of 15 to 30 percent and constitutes another map unit. Because these patterns are seldom abrupt, some overlap occurs.

The landform in the Sierra Nevada foothills uniformly consists of hills. The soils, however, are highly diverse due to extreme differences in parent material. Additional information is available under the heading “Parent Material and Time” in the “Soil Formation” section.

Climate

Prepared by Greg Johnson, National Water and Climate Center, Natural Resources Conservation Service, Portland, Oregon.

The climate tables were created using data from a climate station at Modesto, California. Additional climate information was derived from the new mean annual precipitation and temperature maps of California. Thunderstorm days, relative humidity, percent sunshine, and wind information were estimated from the first order station at Stockton, California.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Modesto in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 48.5 degrees F and the average daily minimum temperature is 39.9 degrees. The lowest temperature on record, which occurred at Modesto on January 11, 1949, is 18 degrees. In summer, the average temperature is 75.8 degrees and the average daily maximum temperature is 91.5 degrees. The highest temperature on record, which occurred at Modesto on June 15, 1961, is 112 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is about 13.15 inches at Modesto. Of this, about 8.9 inches, or 68 percent, usually falls in November through February. Summer is very dry, and there is normally less than one half inch of rain between June and September. Annual precipitation typically ranges from about 14 inches in the western part of the survey area to about 18 inches along the eastern border. The heaviest 1-day rainfall during the period of record was 2.72 inches at Modesto on March 4, 1978. Thunderstorms occur on about 3 days each year and can occur in any month.

The average seasonal snowfall is only 0.1 inches at Modesto and is less than one inch over the entire survey area. The greatest snow depth at any one time during the period of record at Modesto was 1 inch recorded on January 21, 1962. There is measurable snowfall over the area only about once every 10 to 20 years. The heaviest 1-day snowfall on record, which occurred at Modesto on January 21, 1962, is 1.5 inches.

The average relative humidity in mid-afternoon is about 25 percent in the summer and about 70 percent in the winter. Humidity is higher at night, and the average at dawn is about 65 percent in the summer and about 90 percent in the winter. The sun shines 95 percent of the time possible in summer and 50 percent in winter (by February, the average is up to 65 percent). The prevailing wind is from the west, except in the late fall and winter, when it is from the southeast. Average wind speed is highest, around 9 miles per hour, in May and June.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or to the surface of the bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map production began with black-and-white aerial photographs flown during the fall of 1998 by the National Aerial Photography Program. The photographs provided complete coverage for the survey area at a scale of approximately 1:24,000. Soil polygons (delineations) separating the map units were scribed by hand on stereo-paired aerial photographs viewed under a stereoscope. The scribed photographs were scanned into an electronic format and orthorectified. The resulting images were used to manually digitize the polygon boundaries. The digitized delineations were printed onto 1:24,000-scale gray-tone orthophotographs. Edits were made on the hard-copy maps and then digitized back to the electronic copy.

Cross-checking against 7.5 minute series, 1:24,000-scale, United States Geological Survey topographic maps and extensive field investigations were used to enhance interpretation of the aerial photographs. The Sacramento and San

Francisco-San Jose Quadrangles provided 1:250,000-scale coverage of the geology of the survey area. Other sources of information included geological reports, published soil surveys of surrounding areas, selected ecological works, and vegetative maps.

Several cartographic products from this survey are available to the public. Paper-copy, 1:24,000-scale, gray-tone orthophotographs have been printed for distribution. The orthophotographs have map unit delineations with a map unit symbol in each polygon. They also have selected cultural features that enhance map navigation. A digitized polygon layer can be down loaded (http://soildatamart.nrcs.usda.gov/) and overlain on a number of different landscape images using a geographic information system. The most current official soil data is available on the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/).

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils on Flood Plains and Stream Terraces

1. Capay-Clear Lake-Hollenbeck

Very deep and deep, nearly level and gently sloping, poorly drained to moderately well drained soils that formed in alluvium derived mainly from metamorphic and volcanic rock sources; in backswamps on flood plains along creeks that drain rangeland

Setting

Landform: Backswamps on flood plains
Slope: 0 to 3 percent

Composition

Extent of the map unit: Almost 1 percent of the survey area
Extent of the components in the map unit:
Capay and similar soils—40 percent
Clear Lake and similar soils—44 percent
Hollenbeck and similar soils—1 percent
Minor components—15 percent

Soil Properties and Qualities

Capay
Depth class: Very deep
Drainage class: Moderately well drained
Position on landform: Flood plains
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Clay loam or clay
Slope: 0 to 2 percent

Clear Lake
Depth class: Very deep
Drainage class: Poorly drained
Position on landform: Swales in drainageways
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Clay
Slope: 0 to 2 percent

Hollenbeck
Depth class: Deep
Drainage class: Moderately well drained
Position on landform: Backswamps on flood plains
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Silty clay, clay, or silty clay loam
Slope: 1 to 3 percent

Minor Components

- Archerdale and Hicksville soils on flood plains
- Peters soils on toeslopes

Use and Management

Major uses: Irrigated crops
Management concerns: High water table, restricted permeability, flooding, and shrink-swell potential
Management measures: A properly maintained drainage system, water management, selection of suitable plants, and proper design of foundations and waste-management structures

2. Honcut-Columbia-Nord

Very deep, nearly level, somewhat poorly drained to well drained soils that formed in alluvium derived from granitoid and mixed rock sources

Setting

Landform: Flood plains and fan skirts
Slope: 0 to 2 percent

Composition

Extent of the map unit: Less than 4 percent (3.6) of the survey area
Extent of the components in the map unit:
Honcut and similar soils—53 percent
Columbia and similar soils—24 percent
Nord and similar soils—8 percent
Minor components—15 percent

Soil Properties and Qualities

Honcut
Depth class: Very deep
Drainage class: Well drained
Position on landform: Flood plains
Parent material: Alluvium derived from granitoid rock sources
Texture of the surface layer: Sandy loam, fine sandy loam, or gravelly sandy loam
Slope: 0 to 2 percent

Columbia
Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on landform: Flood plains
Parent material: Alluvium derived from mixed rock sources
Texture of the surface layer: Sandy loam
Slope: 0 to 2 percent

Nord
Depth class: Very deep
Drainage class: Well drained
Position on landform: Fan skirts
Parent material: Alluvium derived from mixed rock sources
Texture of the surface layer: Loam
Slope: 0 to 2 percent

Minor Components

- Cogna, Chuloak, and Veritas soils on alluvial fans
- Delhi soils, Mine dredge tailings, and Riverwash on flood plains

Use and Management

Major uses: Irrigated crops and homesite development
Management concerns: Restricted permeability
Management measures: Water management and proper design of waste-management structures

3. Chuloak

Very deep, nearly level, moderately well drained soils that formed in alluvium derived from granitoid rock sources

Setting

Landform: Alluvial fans
Slope: 0 to 2 percent

Composition

Extent of the map unit: 1 percent of the survey area
Extent of the components in the map unit:
Chuloak and similar soils—85 percent
Minor components—15 percent

Soil Properties and Qualities

Chuloak
Depth class: Very deep
Drainage class: Moderately well drained
Position on landform: Alluvial fans
Parent material: Alluvium derived from granitoid rock sources
Texture of the surface layer: Sandy loam
Slope: 0 to 2 percent

Minor Components

- Archerdale and Hicksville soils on stream terraces
- Veritas and Delhi soils on alluvial fans

Use and Management

Major uses: Irrigated crops and homesite development

Management concerns: Restricted permeability
Management measures: Water management and proper design of waste-management structures

4. Archerdale-Hicksville

Very deep, nearly level and gently sloping, well drained and moderately well drained soils that formed in alluvium derived from metamorphic and volcanic rock sources

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Composition

Extent of the map unit: Less than 9 percent of the survey area
Extent of the components in the map unit:
Archerdale and similar soils—56 percent
Hicksville and similar soils—29 percent
Minor components—15 percent

Soil Properties and Qualities

Archerdale
Depth class: Very deep
Drainage class: Well drained
Position on landform: Stream terraces
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Clay loam or stratified very fine sandy loam
Slope: 0 to 2 percent

Hicksville
Depth class: Very deep
Drainage class: Moderately well drained
Position on landform: Stream terraces
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Loam or gravelly loam
Slope: 0 to 2 percent

Minor Components

- Capay, Hollenbeck, and Clear Lake soils on flood plains
- Chuloak and Finrod soils on alluvial fans
- Nord soils on fan skirts
- Peters soils on toeslopes

Use and Management

Major uses: Irrigated crops and homesite development
Management concerns: Restricted permeability
Management measures: Water management and proper design of waste-management structures

5. Pardee

Shallow, nearly level and gently sloping, well drained soils that formed in alluvium derived from mixed rock sources

Setting

Landform: Fan remnants
Slope: 0 to 3 percent

Composition

Extent of the map unit: 0.2 percent of the survey area
Extent of the components in the map unit:
Pardee and similar soils—85 percent
Minor components—15 percent

Soil Properties and Qualities

Pardee
Depth class: Shallow
Drainage class: Well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from mixed rock sources
Texture of the surface layer: Gravelly loam or cobbly loam
Slope: 0 to 3 percent

Minor Components

- Pentz soils on backslopes
- Peters soils on toeslopes
- Redding and Keyes soils on fan remnants

Use and Management

Major uses: Livestock grazing
Management concerns: Limited available water capacity
Management measures: Prescribed grazing

Soils on Alluvial Fans

6. Finrod-Veritas-Cogna

Very deep and deep, nearly level, well drained soils that formed in alluvium derived from metamorphic and volcanic rock sources

Setting

Landform: Alluvial fans
Slope: 0 to 2 percent

Composition

Extent of the map unit: 1 percent of the survey area
Extent of the components in the map unit:
Finrod and similar soils—40 percent
Veritas and similar soils—30 percent
Cogna and similar soils—15 percent
Minor components—15 percent

Soil Properties and Qualities

Finrod
Depth class: Deep
Drainage class: Moderately well drained
Position on landform: Alluvial fans
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Clay
Slope: 0 to 2 percent

Veritas
Depth class: Very deep
Drainage class: Moderately well drained
Position on landform: Alluvial fans
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Fine sandy loam or sandy loam
Slope: 0 to 2 percent

Cogna
Depth class: Very deep
Drainage class: Well drained
Position on landform: Alluvial fans
Parent material: Alluvium derived from metamorphic and volcanic rock sources
Texture of the surface layer: Loam
Slope: 0 to 2 percent

Minor Components

- Archerdale and Hicksville soils on stream terraces
- Columbia and Honcut soils on flood plains
- Hollenbeck soils in backswamps
- Madera soils on fan remnants
- Nord soils on fan skirts

Use and Management

Major uses: Irrigated crops and homesite development
Management concerns: Restricted permeability
Management measures: Water management and proper design of waste-management structures

7. Delhi

Very deep, nearly level, somewhat excessively drained soils that formed in wind-modified, sandy alluvium derived from granitoid rock sources

Setting

Landform: Sand sheets and dunes
Slope: 0 to 2 percent

Composition

Extent of the map unit: Greater than 1 percent of the survey area
Extent of the components in the map unit:
Delhi and similar soils—85 percent
Minor components—15 percent

Soil Properties and Qualities

Delhi
Depth class: Very deep
Drainage class: Somewhat excessively drained
Position on landform: Sand sheets and dunes
Parent material: Alluvium derived from granitoid rock sources
Texture of the surface layer: Loamy sand or fine sand
Slope: 0 to 2 percent

Minor Components

- Honcut soils on flood plains
- Nord soils on fan skirts
- Veritas soils on alluvial fans

Use and Management

Major uses: Irrigated crops, orchards, and vineyards
Management concerns: Wind erosion and droughtiness
Management measures: Water management, windbreak establishment, and selection of suitable plants

Soils on Low Fan Remnants

8. San Joaquin-Exeter-Madera

Moderately deep to a duripan, nearly level to gently rolling, moderately well drained soils that formed in alluvium derived from granitoid and mixed rock sources

Setting

Landform: Fan remnants
Slope: 0 to 5 percent

Composition

Extent of the map unit: 10 percent of the survey area
Extent of the components in the map unit:
San Joaquin and similar soils—65 percent
Exeter and similar soils—16 percent
Madera and similar soils—4 percent
Minor components—15 percent

Soil Properties and Qualities

San Joaquin
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from granitoid and mixed rock sources
Texture of the surface layer: Sandy loam or loam
Slope: 0 to 5 percent

Exeter
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from mixed rock sources
Texture of the surface layer: Sandy clay loam
Slope: 0 to 5 percent

Madera
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from granitoid sources
Texture of the surface layer: Sandy loam or loam
Slope: 0 to 5 percent

Minor Components

- Alamo soils in backswamps
- Jahant and Cometa soils on fan remnants

Use and Management

Major uses: Irrigated crops and pasture
Management concerns: Restricted permeability, restricted root penetration, and droughtiness
Management measures: Water management; deep chiseling and ripping; and selection of suitable plants

Soils on High Fan Remnants

9. Cometa

Moderately deep, gently sloping and moderately sloping, moderately well drained soils that formed in fine-loamy alluvium derived from granitoid rock sources

Setting

Landform: Fan remnants
Slope: 2 to 8 percent

Composition

Extent of the map unit: 7 percent of the survey area
Extent of the components in the map unit:
Cometa and similar soils—85 percent
Minor components—15 percent

Soil Properties and Qualities

Cometa
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from granitoid rock sources
Texture of the surface layer: Sandy loam
Slope: 2 to 8 percent

Minor Components

- Alamo soils in backswamps
- San Joaquin and Madera soils on fan remnants

Use and Management

Major uses: Irrigated crops and pasture
Management concerns: Restricted permeability
Management measures: Water management and selection of suitable plants

10. Redding-Keyes-Bellota

Moderately deep and shallow, gently sloping to strongly sloping, moderately well drained soils that formed in fine-loamy alluvium derived from mixed rock sources

Setting

Landform: Fan remnants
Slope: 0 to 30 percent

Composition

Extent of the map unit: 3 percent of the survey area
Extent of the components in the map unit:
Redding and similar soils—82 percent
Keyes and similar soils—2 percent
Bellota and similar soils—1 percent
Minor components—15 percent

Soil Properties and Qualities

Redding
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from mixed rock sources
Texture of the surface layer: Gravelly sandy loam, gravelly loam, cobbly loam, or loam
Slope: 0 to 30 percent

Keyes
Depth class: Shallow
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from mixed rock sources
Texture of the surface layer: Gravelly loam
Slope: 0 to 30 percent

Bellota
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from dominantly granitoid rock sources
Texture of the surface layer: Sandy loam or loam
Slope: 0 to 30 percent

Minor Components

- Pardee soils on fan remnants
- Pentz soils on backslopes

Use and Management

Major uses: Irrigated crops and pasture
Management concerns: Restricted permeability, restricted root penetration, and droughtiness
Management measures: Water management; deep chiseling and ripping; and selection of suitable plants

Soils on Andesitic Hills

11. Pentz-Peters

Shallow, gently sloping to steep, well drained soils that formed in material weathered from andesitic, tuffaceous sandstone

Setting

Landform: Hillslopes
Slope: 2 to 50 percent

Composition

Extent of the map unit: 43 percent of the survey area
Extent of the components in the map unit:
Pentz and similar soils—54 percent
Peters and similar soils—31 percent
Minor components—15 percent

Soil Properties and Qualities

Pentz
Depth class: Shallow
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from andesitic, tuffaceous sandstone
Texture of the surface layer: Sandy loam
Slope: 5 to 50 percent

Peters
Depth class: Shallow
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from andesitic, tuffaceous sandstone
Texture of the surface layer: Clay, silty clay, clay loam, or silty clay loam
Slope: 2 to 8 percent

Minor Components

- Hollenbeck soils in backswamps
- Pardee, Archerdale, and Hicksville soils on stream terraces
- Redding, Keyes, and Bellota soils on fan remnants
- Rock outcrop on shoulder slopes

Use and Management

Major uses: Livestock grazing
Management concerns: Erosion, steepness of slope, and restricted permeability
Management measures: Prescribed grazing, erosion control, and proper design of foundations and waste-management structures

12. Pentz-Peters-Cometa

Shallow and moderately deep, gently sloping to steep, well drained and moderately well drained soils that formed in material weathered from andesitic, tuffaceous sandstone

Setting

Landform: Hillslopes
Slope: 2 to 50 percent

Composition

Extent of the map unit: 1 percent of the survey area
Extent of the components in the map unit:
Pentz and similar soils—45 percent
Peters and similar soils—25 percent
Cometa and similar soils—15 percent
Minor components—15 percent

Soil Properties and Qualities

Pentz
Depth class: Shallow
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from andesitic, tuffaceous sandstone
Texture of the surface layer: Sandy loam
Slope: 5 to 50 percent

Peters
Depth class: Shallow
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from andesitic, tuffaceous sandstone
Texture of the surface layer: Clay, silty clay, clay loam, or silty clay loam
Slope: 2 to 8 percent

Cometa
Depth class: Moderately deep
Drainage class: Moderately well drained
Position on landform: Fan remnants
Parent material: Alluvium derived from granitoid rock sources
Texture of the surface layer: Sandy loam
Slope: 2 to 8 percent

Minor Components

- Hollenbeck soils in backswamps
- Pardee, Archerdale, and Hicksville soils on stream terraces
- Redding, Keyes, and Bellota soils on fan remnants
- Rock outcrop on shoulder slopes

Use and Management

Major uses: Livestock grazing
Management concerns: Erosion, steepness of slope, and restricted permeability
Management measures: Prescribed grazing, erosion control, and proper design of foundations and waste-management structures

Soils on Rhyolitic Hills

13. Amador-Mckeonhills

Shallow and moderately deep, moderately sloping to moderately steep, well drained soils that formed in material weathered from tuffaceous rhyolite and mudstone

Setting

Landform: Hillslopes
Slope: 5 to 30 percent

Composition

Extent of the map unit: 11 percent of the survey area
Extent of the components in the map unit:
Amador and similar soils—79 percent
Mckeonhills and similar soils—6 percent
Minor components—15 percent

Soil Properties and Qualities

Amador
Depth class: Shallow
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from tuffaceous rhyolite
Texture of the surface layer: Sandy loam or loam
Slope: 5 to 30 percent

Mckeonhills
Depth class: Moderately deep
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from mudstone
Texture of the surface layer: Clay, silty clay, clay loam, or silty clay loam
Slope: 5 to 15 percent

Minor Components

- Auburn and Pentz soils on backslopes
- Peters soils on toeslopes
- Rock outcrop on shoulder slopes

Use and Management

Major uses: Livestock grazing
Management concerns: Erosion, steepness of slope, and restricted permeability
Management measures: Prescribed grazing, erosion control, and proper design of foundations and waste-management structures

Soils on Metabasaltic Hills

14. Auburn

Shallow, moderately sloping to steep, well drained soils that formed in material weathered from metamorphosed basalt

Setting

Landform: Hillslopes
Slope: 5 to 50 percent

Composition

Extent of the map unit: 5 percent of the survey area
Extent of the components in the map unit:
Auburn and similar soils—85 percent
Minor components—15 percent

Soil Properties and Qualities

Auburn
Depth class: Shallow
Drainage class: Well drained
Position on landform: Hillslopes
Parent material: Material weathered from metamorphosed basalt
Texture of the surface layer: Silt loam or loam
Slope: 5 to 50 percent

Minor Components

- Amador and Pentz soils on backslopes
- Peters soils on toeslopes
- Rock outcrop in all slope positions

Use and Management

Major uses: Livestock grazing
Management concerns: Erosion, steepness of slope, and restricted permeability
Management measures: Prescribed grazing, erosion control, and proper design of foundations and waste-management structures

Miscellaneous

15. Water

Rivers, creeks, and reservoirs, including Woodward reservoir

16. Riverwash-Mine Dredge Tailings

Modified gravelly alluvium derived from metamorphic and mixed rock sources

Setting

Landform: Flood plains and stream terraces
Slope: 0 to 2 percent

Composition

Extent of the map unit: 1 percent of the survey area
Extent of the components in the map unit:
Riverwash—75 percent
Mine dredge tailings—20 percent
Minor components—5 percent

Minor Components

- Columbia soils on flood plains

Detailed Soil Map Units

The map units on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness,

salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Columbia sandy loam, drained, 0 to 2 percent slopes, rarely flooded, is a phase of the Columbia series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Mine dredge tailings-Riverwash complex, 0 to 2 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Peters-Pentz association, 2 to 8 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Water is an example.

Some terms used in this section are defined in “Soil Taxonomy” (Soil Survey Staff, 1999). Typic Xerorthents and Mollic Haploxeralfs are examples.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

100—Capay clay, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along Simmons Creek near the Farmington Flood Control Basin
Major uses: Irrigated row crops and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 150 to 160 feet (47 to 49 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Capay clay—90 percent
Minor components—10 percent

Characteristics of the Capay Soil

Slope: 0 to 2 percent
Aspect: South to east
Landform: Backswamps
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops

Selected properties and qualities
Surface pH: 7.0
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 9.4 inches (high)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: Dams on drainageways, such as Simmons Creek, and levees, drainage ditches, and leveled fields have changed the frequency and duration of flooding and ponding. The high water table is a result of irrigation, and artificial drainage is used to lower the water table.
Present flooding: Rare
Present ponding: Occasional
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 41.5 (revised method)

Typical profile
A—0 to 20 inches; clay
Bkss—20 to 40 inches; clay
Bk—40 to 60 inches; clay loam

Minor Components

Clear Lake clay and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Archerdale clay loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hicksville loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Madera sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

102—Alamo clay, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along drainageways on fan remnants south of Littlejohn Creek
Major uses: Irrigated row crops and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 190 to 200 feet (58 to 61 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Alamo clay—90 percent
Minor components—10 percent

Characteristics of the Alamo Soil

Slope: 0 to 2 percent
Aspect: South to northeast
Landform: Backswamps and fan remnants
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops

Selected properties and qualities
Surface pH: 7.0
Surface area covered by coarse fragments: None
Depth to restrictive feature: 20 to 40 inches to a duripan
Slowest permeability class: Slow above the duripan
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 4.8 inches (low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: The landscape has been altered by deep ripping, cutting, and/or filling.
Present flooding: Rare
Present ponding: Occasional
Surface runoff: Very high
Current water table: None noted
Natural drainage class: Poorly drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 3w
Land capability classification, nonirrigated: 4w
California Storie index: 9.4 (revised method)

Typical profile
Ap—0 to 10 inches; clay
Bw—10 to 34 inches; clay
Bkqm—34 to 60 inches; indurated material

Minor Components

Madera sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

San Joaquin sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Jahant loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

106—Archerdale very fine sandy loam, overwash, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along drainageways near the Farmington Flood Control Basin
Major uses: Irrigated row crops, orchards, and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 140 to 150 feet (44 to 46 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Archerdale very fine sandy loam, overwash—85 percent
Minor components—15 percent

Characteristics of the Archerdale Soil

Slope: 0 to 2 percent
Aspect: Southeast to west
Landform: Treads on stream terraces
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.7
Surface area covered by coarse fragments: 1 to 10 percent fine, subangular pebbles; 0 to 2 percent coarse, rounded pebbles; 0 to 1 percent rounded cobbles
Restrictive feature: None noted
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic

Available water capacity to a depth of 60 inches: About 9.8 inches (high)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: Rare
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: C

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 84.0 (revised method)

Typical profile
Ap—0 to 10 inches; very fine sandy loam
A—10 to 30 inches; clay
Bw—30 to 60 inches; clay

Minor Components

Capay clay and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Hicksville loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hollenbeck clay and similar soils
Composition: About 3 percent of the map unit
Slope: 1 to 3 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Clear Lake clay and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Finrod clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

107—Archerdale clay loam, 0 to 2 percent slopes

Map Unit Setting

General location: Extensive areas along major drainageways passing through rangelands
Major uses: Irrigated row crops, orchards, and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 140 to 150 feet (44 to 46 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Archerdale clay loam—85 percent
Minor components—15 percent

Characteristics of the Archerdale Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Treads on stream terraces
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.7
Surface area covered by coarse fragments: 1 to 10 percent fine, subangular pebbles; 0 to 2 percent coarse, rounded pebbles; 0 to 1 percent rounded cobbles
Restrictive feature: None noted
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 9.8 inches (high)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: C

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 75.6 (revised method)

Typical profile
Ap—0 to 10 inches; clay loam
A—10 to 30 inches; clay
Bw—30 to 60 inches; clay

Minor Components

Capay clay and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Hicksville loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hollenbeck clay and similar soils
Composition: About 3 percent of the map unit
Slope: 1 to 3 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Clear Lake clay and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Finrod clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

127—Chuloak sandy loam, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along the Stanislaus River near Calaveras County
Major uses: Irrigated row crops, orchards, and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 65 to 295 feet (21 to 91 meters)

Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Chuloak sandy loam—85 percent
Minor components—15 percent

Characteristics of the Chuloak Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Alluvial fans
Parent material: Fine-loamy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderately slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 8.4 inches (high)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 1
Land capability classification, nonirrigated: 4c
California Storie index: 72.9 (revised method)

Typical profile
Ap—0 to 12 inches; sandy loam
Bt—12 to 38 inches; loam
C—38 to 60 inches; sandy loam

Minor Components

Delhi loamy sand and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Sand sheets
Typical vegetation: Irrigated crops, orchards, and vineyards

Madera fine sandy loam and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Veritas sandy loam and similar soils
Composition: About 4 percent of the map unit

Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

Archerdale clay loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hicksville loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

128—Cogna loam, 0 to 2 percent slopes, overwash

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and adjacent to the Calaveras River
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 65 to 150 feet (21 to 46 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Cogna loam—85 percent
Minor components—15 percent

Characteristics of the Cogna Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Alluvial fans
Parent material: Fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.4
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderate
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 9.2 inches (high)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: Rare

Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 1
Land capability classification, nonirrigated: 4c-1
California Storie index: 90.0 (historical method)

Typical profile
A—0 to 25 inches; loam
Bk—25 to 38 inches; clay loam
C—38 to 64 inches; loam

Minor Components

Archerdale and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Nord and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Honcut and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

129—Cogna loam, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys

Elevation: 65 to 150 feet (21 to 46 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Cogna loam—85 percent
Minor components—15 percent

Characteristics of the Cogna Soil

Slope: 0 to 2 percent
Aspect: Southeast to southwest
Landform: Alluvial fans
Parent material: Fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.4
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderate
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 9.2 inches (high)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: Rare
Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 1
Land capability classification, nonirrigated: 4c-1
California Storie index: 90.0 (historical method)

Typical profile
A—0 to 25 inches; loam
Bk—25 to 38 inches; clay loam
C—38 to 64 inches; loam

Minor Components

Archerdale and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Treads on stream terraces
Typical vegetation: Irrigated crops and pasture

Nord and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent

Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Honcut and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

130—Columbia sandy loam, drained, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

General location: Extensive areas along the Stanislaus River
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 35 to 150 feet (12 to 46 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Columbia sandy loam, rarely flooded—85 percent
Minor components—15 percent

Characteristics of the Columbia Soil

Slope: 0 to 2 percent
Aspect: East to northwest
Landform: Flood plains
Parent material: Coarse-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 7.0
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 6.0 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Altered hydrology: Dams on drainageways, such as the Stanislaus River, and levees, drainage ditches, and leveled fields have changed the frequency and duration of flooding and ponding.
Present flooding: Rare
Present ponding: None
Surface runoff: Very low
Current water table: None noted
Natural drainage class: Somewhat poorly drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 65.3 (revised method)

Typical profile
Ap—0 to 13 inches; sandy loam
C—13 to 60 inches; stratified sand

Minor Components

Honcut fine sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia, occasionally flooded, and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Cogna, rarely flooded, and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia, frequently flooded, and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Cogna, overwash, and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Mine dredge tailings
Composition: About 1 percent of the map unit
Slope: 0 to 5 percent
Landform: Flood plains
Typical vegetation: Mounds of mine dredge tailings are barren due to droughtiness. In the valleys of the Calaveras and Stanislaus Rivers and South Gulch Creek, annual grasses, forbs, shrubs, and scattered riparian hardwood trees grow in the

intermound areas. At the extreme northern tip of the survey area and extending into San Joaquin County, scattered annual grasses and forbs grow in the intermound areas.

Riverwash
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Shrubs, annual grasses, forbs, and scattered riparian hardwoods

131—Columbia sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

General location: Small areas along the Stanislaus River
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 35 to 120 feet (12 to 37 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Columbia sandy loam, occasionally flooded—85 percent
Minor components—15 percent

Characteristics of the Columbia Soil

Slope: 0 to 2 percent
Aspect: East to northwest
Landform: Flood plains
Parent material: Coarse-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 7.0
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 6.0 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Altered hydrology: Dams on drainageways, such as the Stanislaus River, and levees, drainage ditches, and leveled fields have changed the frequency and duration of flooding and ponding. In areas that are not protected by levees, flood debris litters the surface. The debris, including logs, is subject rearrangement on an annual basis.
Present flooding: Occasional
Present ponding: None
Surface runoff: Very low

Current water table: None noted
Natural drainage class: Somewhat poorly drained
Hydrologic soil group: C

Interpretive groups
Land capability classification, irrigated: 2w
Land capability classification, nonirrigated: 4w
California Storie index: 65.3 (revised method)

Typical profile
Ap—0 to 13 inches; sandy loam
C—13 to 60 inches; stratified loamy sand

Minor Components

Honcut fine sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia, rarely flooded, and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Cogna, rarely flooded, and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia, frequently flooded, and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Cogna, overwash, and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Mine dredge tailings
Composition: About 1 percent of the map unit
Slope: 0 to 5 percent
Landform: Flood plains
Typical vegetation: Mounds of mine dredge tailings are barren due to droughtiness. In the valleys of the Calaveras and Stanislaus Rivers and South Gulch Creek, annual grasses, forbs, shrubs, and scattered riparian hardwood trees grow in the intermound areas. At the extreme northern tip of the survey area and extending into San Joaquin County, scattered annual grasses and forbs grow in the intermound areas.

Riverwash
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent

Landform: Flood plains
Typical vegetation: Shrubs, annual grasses, forbs, and scattered riparian hardwoods

134—Cometa sandy loam, 2 to 8 percent slopes

Map Unit Setting

General location: Moderately extensive areas along and to the south of Littlejohn Creek
Major uses: Livestock grazing; dryland grain crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 15 to 400 feet (6 to 122 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Cometa sandy loam—85 percent
Minor components—15 percent

Characteristics of the Cometa Soil

Slope: 2 to 8 percent
Aspect: Southeast to north
Landform: Treads on fan remnants
Parent material: Fine-loamy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: None
Depth to restrictive feature: 20 to 40 inches to a cemented horizon
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 3.0 inches (low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 44.3 (revised method)

Typical profile
A—0 to 15 inches; sandy loam
Bt—15 to 40 inches; clay loam
Btq—40 to 60 inches; sandy loam

Minor Components

San Joaquin sandy loam and similar soils
Composition: About 7 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Madera sandy loam and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Alamo clay and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

142—Delhi loamy sand, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along the Stanislaus River and south of Woodward Reservoir
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains; valleys
Elevation: 25 to 1,400 feet (8 to 427 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Delhi loamy sand—85 percent
Minor components—15 percent

Characteristics of the Delhi Soil

Slope: 0 to 2 percent
Aspect: East to northwest
Landform: Sand sheets
Parent material: Wind-modified sandy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 7.0
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 4.7 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Very low
Current water table: None noted
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: A

Interpretive groups
Land capability classification, irrigated: 3s
Land capability classification, nonirrigated: 4e
California Storie index: 66.8 (revised method)

Typical profile
A—0 to 20 inches; loamy sand
C—20 to 60 inches; loamy sand

Minor Components

Honcut fine sandy loam and similar soils
Composition: About 7 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas fine sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

151—Mine dredge tailings-Riverwash complex, 0 to 5 percent slopes

Map Unit Setting

General location: Small areas on a broad fan remnant just west of South Gulch Creek, along South Gulch Creek, along the Calaveras River, and along the upper reaches of the Stanislaus River
Major uses: Aggregate source, recreation, wildlife habitat, and homesite development
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 95 to 350 feet (30 to 107 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Mine dredge tailings—20 percent
Riverwash—75 percent
Minor components—5 percent

Characteristics of the Mine Dredge Tailings

Slope: 0 to 5 percent
Aspect: None noted
Landform: Flood plains and stream terraces
Parent material: Modified gravelly alluvium derived from metamorphic rock
Typical vegetation: Mounds of mine dredge tailings are barren due to droughtiness. In the valleys of the Calaveras and Stanislaus Rivers and South Gulch Creek, annual grasses, forbs, shrubs, and scattered riparian hardwood trees grow in the intermound areas. At the extreme northern tip of the survey area and extending into San Joaquin County, scattered annual grasses and forbs grow in the intermound areas.

Selected properties and qualities
Surface features: Tailings consist of linear piles of gravel, cobbles, and stones. The piles are 5 to 40 feet in height and have depressional areas. Some areas have been leveled.
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.2 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Altered hydrology: Flood control structures have reduced the natural frequency and duration of flooding. Drainage and irrigation ditches have modified the natural depth to a water table. Roads, ditches, levees, leveling, and urban construction have modified overland flow patterns, runoff, and the depth, frequency, and duration of ponding.
Present flooding: Occasional
Present ponding: None
Surface runoff: Very low
Current water table: None noted
Natural drainage class: Excessively drained
Hydrologic soil group: A

Interpretive groups
Land capability classification, irrigated: Not calculated
Land capability classification, nonirrigated: 8s

Characteristics of the Riverwash

Slope: 0 to 2 percent
Aspect: None noted
Landform: Flood plains
Parent material: Gravelly alluvium derived from metamorphic rock
Typical vegetation: Shrubs, annual grasses, forbs, and scattered riparian hardwoods

Selected properties and qualities
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.8 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: Frequent
Present ponding: None
Surface runoff: Very high
Current water table: Present
Natural drainage class: Excessively drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: Not calculated
Land capability classification, nonirrigated: 8w

Minor Components

Columbia, frequently flooded, and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia, occasionaly flooded, and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

157—Exeter sandy clay loam, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas south of Woodward Reservoir
Major uses: Irrigated crops, orchards, and vineyards and homesite development
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 190 to 200 feet (58 to 61 meters)
Mean annual precipitation: 14 to 15 inches (355 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Exeter sandy clay loam—85 percent
Minor components—15 percent

Characteristics of the Exeter Soil

Slope: 0 to 2 percent
Aspect: South to north
Landform: Treads on fan remnants
Parent material: Coarse-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 7.3
Surface area covered by coarse fragments: None
Depth to restrictive feature: 20 to 40 inches to a duripan
Slowest permeability class: Impermeable

Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 4.4 inches (low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: None
Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: C

Interpretive groups
Land capability classification, irrigated: 3s
Land capability classification, nonirrigated: 4s
California Storie index: 29.8 (revised method)

Typical profile
A—0 to 12 inches; sandy clay loam
Bt—12 to 36 inches; sandy clay loam
Bqm—36 to 60 inches; cemented, indurated material

Minor Components

Madera sandy loam and similar soils
Composition: About 7 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

San Joaquin sandy loam and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Alamo clay and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

158—Finrod clay, 0 to 2 percent slopes

Map Unit Setting

General location: A large area along the northern part of the boundary between Stanislaus County and San Joaquin County in the Farmington Flood Control Basin
Major uses: Homesite development
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 190 to 200 feet (58 to 61 meters)

Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Finrod clay—85 percent
Minor components—15 percent

Characteristics of the Finrod Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Alluvial fans
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 7.0
Surface area covered by coarse fragments: None
Depth to restrictive feature: 40 to 60 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 6.0 inches (moderate)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: C

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 41.1 (revised method)

Typical profile
A—0 to 25 inches; clay
Bw—25 to 40 inches; clay loam
Bkqm—40 to 60 inches; cemented material

Minor Components

Archerdale clay loam and similar soils
Composition: About 7 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Cogna loam and similar soils
Composition: About 5 percent of the map unit
Slope: 1 to 3 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Hollenbeck clay and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

170—Hicksville loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

General location: Moderately extensive areas along major drainageways passing through rangelands
Major uses: Livestock grazing and some irrigated pasture
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 130 to 225 feet (40 to 70 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Hicksville loam—85 percent
Minor components—15 percent

Characteristics of the Hicksville Soil

Slope: 0 to 2 percent
Aspect: East to north
Landform: Treads on stream terraces
Parent material: Fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: 0 to 2 percent coarse, rounded pebbles; 1 to 10 percent fine, subangular pebbles; 0 to 1 percent rounded cobbles
Restrictive feature: None noted
Slowest permeability class: Moderately slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 12.0 inches (very high)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2w

Land capability classification, nonirrigated: 4w
California Storie index: 52.0 (revised method)

Typical profile
A—0 to 10 inches; loam
Bt—10 to 45 inches; gravelly sandy clay loam
2Bt—45 to 60 inches; stratified clay loam and sandy loam

Minor Components

Archerdale clay loam and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Peters clay and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Mounds and swales
Typical vegetation: Annual grasses, forbs, and dryland grains

Chuloak sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

172—Hicksville gravelly loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

General location: Small areas near Woodward Reservoir
Major uses: Livestock grazing and some irrigated pasture
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 130 to 225 feet (40 to 70 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Hicksville gravelly loam—85 percent
Minor components—15 percent

Characteristics of the Hicksville Soil

Slope: 0 to 2 percent
Aspect: Southeast to northeast
Landform: Treads on stream terraces

Parent material: Fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: 1 to 10 percent fine, subangular pebbles; 0 to 2 percent coarse, rounded pebbles; 0 to 1 percent rounded cobbles
Restrictive feature: None noted
Slowest permeability class: Moderately slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 12.0 inches (very high)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2w
Land capability classification, nonirrigated: 4w
California Storie index: 52.0 (revised method)

Typical profile
A—0 to 10 inches; gravelly loam
Bt—10 to 45 inches; gravelly sandy clay loam
2Bt—45 to 60 inches; stratified sandy loam and clay loam

Minor Components

Archerdale clay loam and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Peters clay and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Mounds and swales
Typical vegetation: Annual grasses, forbs, and dryland grains

Chuloak sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

174—Hollenbeck silty clay, 1 to 3 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Irrigated row crops and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 120 to 150 feet (37 to 46 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Hollenbeck silty clay—85 percent
Minor components—15 percent

Characteristics of the Hollenbeck Soil

Slope: 1 to 3 percent
Aspect: Southeast to north
Landform: Backswamps, flood plains, and swales
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops

Selected properties and qualities
Surface pH: 7.2
Surface area covered by coarse fragments: None
Depth to restrictive feature: 40 to 60 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 5.6 inches (moderate)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 2e-5
Land capability classification, nonirrigated: 4e-5
California Storie index: 33.0 (historical method)

Typical profile
A—0 to 10 inches; silty clay
Bss—10 to 37 inches; clay
Bk—37 to 42 inches; silty clay loam
Bkqm—42 to 60 inches; cemented, indurated material

Minor Components

Capay clay and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Treads on alluvial fans
Typical vegetation: Irrigated crops

Peters clay and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Side slopes
Typical vegetation: Annual grasses and forbs

Unnamed soils that are ponded
Composition: About 3 percent of the map unit
Slope: 0 to 1 percent
Landform: Backswamps
Typical vegetation: Not determined

Archerdale clay loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

175—Honcut sandy loam, 0 to 2 percent slopes

Map Unit Setting

General location: Extensive areas along the Stanislaus River
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 145 to 160 feet (45 to 49 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Honcut sandy loam—85 percent
Minor components—15 percent

Characteristics of the Honcut Soil

Slope: 0 to 2 percent
Aspect: East to west
Landform: Flood plains
Parent material: Coarse-loamy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.5
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Not saline
Sodicity: Not sodic

Available water capacity to a depth of 60 inches: About 6.5 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Very low
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 1
Land capability classification, nonirrigated: 4c
California Storie index: 72.9 (revised method)

Typical profile
A—0 to 14 inches; sandy loam
C—14 to 60 inches; coarse sandy loam

Minor Components

Columbia sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

Delhi loamy sand and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Sand sheets
Typical vegetation: Irrigated crops, orchards, and vineyards

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas fine sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

176—Honcut fine sandy loam, 2 to 5 percent slopes

Map Unit Setting

General location: Small areas along the Stanislaus River near Calaveras County
Major uses: Irrigated row crops, orchards, field crops, and vineyards

Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 145 to 160 feet (45 to 49 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Honcut fine sandy loam—85 percent
Minor components—15 percent

Characteristics of the Honcut Soil

Slope: 2 to 5 percent
Aspect: East to west
Landform: Flood plains
Parent material: Coarse-loamy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.5
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 6.6 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Very low
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 73.2 (revised method)

Typical profile
A—0 to 14 inches; fine sandy loam
C—14 to 60 inches; coarse sandy loam

Minor Components

Columbia sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

Delhi loamy sand and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Sand sheets
Typical vegetation: Irrigated crops, orchards, and vineyards

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas fine sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

177—Honcut gravelly sandy loam, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along the Stanislaus River
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 145 to 160 feet (45 to 49 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Honcut gravelly sandy loam—85 percent
Minor components—15 percent

Characteristics of the Honcut Soil

Slope: 0 to 2 percent
Aspect: Northeast to southwest
Landform: Flood plains
Parent material: Coarse-loamy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 6.5
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 5.9 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Very low

Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 52.3 (revised method)

Typical profile
A—0 to 14 inches; gravelly sandy loam
C—14 to 60 inches; gravelly coarse sandy loam

Minor Components

Columbia sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan skirts
Typical vegetation: Irrigated crops, orchards, and vineyards

Delhi loamy sand and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Sand sheets
Typical vegetation: Irrigated crops, orchards, and vineyards

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas fine sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

183—Jahant loam, 2 to 8 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 15 to 160 feet (6 to 49 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)

Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Jahant loam—85 percent
Minor components—15 percent

Characteristics of the Jahant Soil

Slope: 2 to 8 percent
Aspect: Northeast to north
Landform: Treads on fan remnants
Parent material: Fine-loamy alluvium derived from igneous rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.3
Surface area covered by coarse fragments: 0 to 13 percent medium, rounded pebbles
Depth to restrictive feature: 40 to 60 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 6.1 inches (moderate)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: None
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 3e-3
Land capability classification, nonirrigated: 4e-3
California Storie index: 24.0 (historical method)

Typical profile
A—0 to 14 inches; loam
Bt1—14 to 31 inches; loam
Bt2—31 to 49 inches; clay
Bqm—49 to 60 inches; cemented, indurated material

Minor Components

San Joaquin sandy loam and similar soils
Composition: About 7 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Madera sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent

Landform: Fan remnants
Typical vegetation: Not determined

Bellota sandy loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 15 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Alamo clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Drainageways and fan remnants
Typical vegetation: Not determined

187—Keyes-Bellota complex, 2 to 15 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 145 to 295 feet (45 to 90 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Keyes gravelly loam—45 percent
Bellota sandy loam—40 percent
Minor components—15 percent

Characteristics of the Keyes Soil

Slope: 2 to 8 percent
Aspect: East to northwest
Landform: Treads on fan remnants
Parent material: Gravelly, fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock over gravelly, clayey alluvium derived from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 6.5
Surface area covered by coarse fragments: 13 to 31 percent medium, rounded pebbles
Depth to restrictive feature: 12 inches to an abrupt textural change; 10 to 20 inches to a duripan; 20 to 40 inches to paralithic bedrock
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Very high
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 7e
Land capability classification, nonirrigated: 7e
California Storie index: 12.0 (historical method)

Typical profile
A—0 to 10 inches; gravelly loam
2Bt—10 to 19 inches; clay
2Bqm—19 to 34 inches; cemented, indurated material
3Cr—34 to 60 inches; weathered bedrock

Characteristics of the Bellota Soil

Slope: 2 to 15 percent
Aspect: East to northwest
Landform: Treads on fan remnants
Parent material: Cobbly, fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock over clayey residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 6.3
Surface area covered by coarse fragments: 0 to 15 percent medium, rounded pebbles
Depth to restrictive feature: 23 inches to an abrupt textural change; 20 to 40 inches to a duripan; 21 to 50 inches to paralithic bedrock
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.7 inches (low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 3e-3
Land capability classification, nonirrigated: 4e-3
California Storie index: 23.0 (historical method)

Typical profile
A—0 to 9 inches; sandy loam
Bt—9 to 23 inches; cobbly sandy clay loam
2Btss—23 to 35 inches; clay

2Bqm—35 to 37 inches; cemented, indurated material
2Cr—37 to 60 inches; weathered bedrock

Minor Components

Pentz loam and similar soils
Composition: About 6 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Redding gravelly loam and similar soils
Composition: About 4 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Jahant loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Alamo clay and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Drainageways and fan remnants
Typical vegetation: Irrigated crops

Pardee gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Peters and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 5 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

188—Keyes-Redding complex, 2 to 8 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 120 to 200 feet (38 to 61 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Keyes gravelly loam—45 percent
Redding gravelly loam—40 percent
Minor components—15 percent

Characteristics of the Keyes Soil

Slope: 2 to 8 percent
Aspect: Southeast to northwest
Landform: Treads on fan remnants
Parent material: Fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock over gravelly, clayey alluvium derived from sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.9
Surface area covered by coarse fragments: 13 to 31 percent medium, rounded pebbles
Depth to restrictive feature: 12 inches to an abrupt textural change; 10 to 20 inches to a duripan; 20 to 40 inches to paralithic bedrock
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Very high
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 7e
Land capability classification, nonirrigated: 7e
California Storie index: 8.0 (historical method)

Typical profile
A—0 to 10 inches; gravelly loam
2Bt—10 to 19 inches; clay
2Bqm—19 to 34 inches; cemented, indurated material
3Cr—34 to 60 inches; weathered bedrock

Characteristics of the Redding Soil

Slope: 2 to 8 percent
Aspect: Southeast to northwest
Landform: Treads on fan remnants
Parent material: Gravelly, fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock over clayey alluvium derived from igneous, metamorphic, and sedimentary rock over gravelly, coarse-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.6

Surface area covered by coarse fragments: 6 to 26 percent fine, subangular pebbles; 3 to 23 percent medium, rounded pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 13 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.6 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Very high
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e-3
Land capability classification, nonirrigated: 4e-3
California Storie index: 15.0 (historical method)

Typical profile
A—0 to 13 inches; gravelly loam
2Bt—13 to 22 inches; clay
3Bqm—22 to 60 inches; cemented, indurated material

Minor Components

Pentz loam and similar soils
Composition: About 5 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Bellota sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Jahant loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Pardee gravelly loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 5 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Alamo clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants, treads, and swales
Typical vegetation: Irrigated crops

193—Madera sandy loam, 0 to 2 percent slopes

Map Unit Setting

General location: Extensive areas south of Woodward Reservoir
Major uses: Livestock grazing and irrigated pasture
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 150 to 180 feet (46 to 55 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Madera sandy loam—85 percent
Minor components—15 percent

Characteristics of the Madera Soil

Slope: 0 to 2 percent
Aspect: Southeast to northwest
Landform: Treads on fan remnants
Parent material: Fine-loamy alluvium derived from granite
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.5
Surface area covered by coarse fragments: None
Depth to restrictive feature: 19 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.5 inches (low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4s
Land capability classification, nonirrigated: 4s
California Storie index: 25.3 (revised method)

Typical profile
Ap—0 to 10 inches; sandy loam

Bt—10 to 19 inches; sandy clay loam
2Bt—19 to 24 inches; clay
2Bkqm—24 to 60 inches; cemented, indurated material

Minor Components

Exeter sandy loam and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Jahant loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Madera, shallow, and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Alamo clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

195—Clear Lake clay, partially drained, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along Simmons Creek and Littlejohn Creek
Major uses: Irrigated row crops and field crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 150 to 200 feet (47 to 61 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Clear Lake clay—85 percent
Minor components—15 percent

Characteristics of the Clear Lake Soil

Slope: 0 to 2 percent
Aspect: Southwest to northeast
Landform: Backswamps
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops

Selected properties and qualities
Surface pH: 8.2
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Sodic within a depth of 40 inches
Available water capacity to a depth of 60 inches: About 8.3 inches (high)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: Dams on drainageways, such as Simmons Creek, and levees, drainage ditches, and leveled fields have changed the frequency and duration of flooding and ponding. The landscape has been altered by deep ripping, cutting, and/or filling.
Present flooding: Rare
Present ponding: Occasional
Surface runoff: Medium
Current water table: Present
Natural drainage class: Poorly drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 2w
Land capability classification, nonirrigated: 4w
California Storie index: 23.9 (revised method)

Typical profile
A—0 to 10 inches; clay
Bss—10 to 63 inches; clay

Minor Components

Capay clay and similar soils
Composition: About 8 percent of the map unit
Slope: 0 to 2 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Archerdale clay loam and similar soils
Composition: About 7 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

201—Nord loam, 0 to 2 percent slopes

Map Unit Setting

General location: Moderately extensive areas south of Woodward Reservoir
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 100 to 160 feet (32 to 50 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Nord loam—85 percent
Minor components—15 percent

Characteristics of the Nord Soil

Slope: 0 to 2 percent
Aspect: Northeast to west
Landform: Fan skirts
Parent material: Coarse-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 7.5
Surface area covered by coarse fragments: None
Restrictive feature: None noted
Slowest permeability class: Moderate
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 7.9 inches (high)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 1
Land capability classification, nonirrigated: 4c
California Storie index: 83.4 (revised method)

Typical profile
A—0 to 25 inches; loam
C—25 to 50 inches; loam
Ck—50 to 60 inches; loam

Minor Components

Honcut gravelly sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Columbia sandy loam and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Delhi loamy sand and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent

Landform: Sand sheets
Typical vegetation: Irrigated crops, orchards, and vineyards

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Alluvial fans
Typical vegetation: Irrigated crops, orchards, and vineyards

Veritas fine sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

202—Pardee gravelly loam, 0 to 3 percent slopes

Map Unit Setting

General location: Small areas along the Stanislaus River near Calaveras County
Major uses: Livestock grazing and wildlife habitat
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 255 to 280 feet (78 to 86 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pardee gravelly loam—85 percent
Minor components—15 percent

Characteristics of the Pardee Soil

Slope: 0 to 3 percent
Aspect: Northeast to northwest
Landform: Treads on fan remnants
Parent material: Gravelly, fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.8
Surface area covered by coarse fragments: 6 to 20 percent fine, subangular pebbles; 3 to 26 percent coarse, rounded pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.2 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Low
Current water table: None noted

Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4s
Land capability classification, nonirrigated: 6s
California Storie index: 16.5 (revised method)

Typical profile
A—0 to 6 inches; gravelly loam
Bt—6 to 11 inches; very gravelly clay loam
2R—11 to 60 inches; unweathered bedrock

Minor Components

Pentz gravelly loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 4 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

Redding gravelly loam and similar soils
Composition: About 3 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Keyes gravelly loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Typic Xerorthents, shallow, loam and similar soils
Composition: About 1 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

206—Pentz fine sandy loam, 2 to 15 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 145 to 260 feet (45 to 80 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)

Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz fine sandy loam—85 percent
Minor components—15 percent

Characteristics of the Pentz Soil

Slope: 2 to 15 percent
Aspect: Southeast to east
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.6
Surface area covered by coarse fragments: 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.5 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 24.5 (revised method)

Typical profile
A—0 to 9 inches; fine sandy loam
Bw—9 to 12 inches; silt loam
Bt—12 to 16 inches; silt loam
Cr—16 to 60 inches; soft or weathered bedrock

Minor Components

Typic Xerorthents, shallow, loam and similar soils
Composition: About 5 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 4 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

Pardee gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Redding gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

Typic Durixerepts sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

207—Pentz fine sandy loam, 15 to 50 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 145 to 275 feet (45 to 85 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz fine sandy loam—85 percent
Minor components—15 percent

Characteristics of the Pentz Soil

Slope: 15 to 50 percent
Aspect: East to northwest
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.8
Surface area covered by coarse fragments: 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.5 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 17.4 (revised method)

Typical profile
A—0 to 9 inches; fine sandy loam
Bw—9 to 12 inches; fine sandy loam
Bt—12 to 16 inches; fine sandy loam
Cr—16 to 60 inches; soft or weathered bedrock

Minor Components

Typic Xerorthents, shallow, loam and similar soils
Composition: About 5 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 4 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

Pardee gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Redding gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent

Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

Typic Durixerepts sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

209—Pentz-Bellota complex, 2 to 15 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 145 to 295 feet (45 to 90 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz loam—55 percent
Bellota sandy loam—30 percent
Minor components—15 percent

Characteristics of the Pentz Soil

Slope: 5 to 15 percent
Aspect: Northeast to north
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.6
Surface area covered by coarse fragments: 3 to 16 percent medium, rounded pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.7 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Low

Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 7e
Land capability classification, nonirrigated: 7e
California Storie index: 30.0 (historical method)

Typical profile
A—0 to 7 inches; loam
Bw—7 to 14 inches; silt loam and loam
Cr—14 to 60 inches; soft or weathered bedrock

Characteristics of the Bellota Soil

Slope: 2 to 8 percent
Aspect: Northeast to north
Landform: Base slopes on fan remnants
Parent material: Cobbly fine-loamy alluvium derived from igneous, metamorphic, and sedimentary rock over clayey residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 6.3
Surface area covered by coarse fragments: 0 to 15 percent medium, rounded pebbles
Depth to restrictive feature: 23 inches to an abrupt textural change; 20 to 40 inches to a duripan; 21 to 50 inches to paralithic bedrock
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.7 inches (low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 3e-8
Land capability classification, nonirrigated: 4e-8
California Storie index: 22.0 (historical method)

Typical profile
A—0 to 9 inches; sandy loam
Bt—9 to 23 inches; cobbly sandy clay loam
2Btss—23 to 35 inches; clay
2Bqm—35 to 37 inches; cemented, indurated material
2Cr—37 to 60 inches; weathered bedrock

Minor Components

Keyes and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 8 percent

Landform: Treads on fan remnants
Typical vegetation: Annual grasses and forbs

Archerdale and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Treads on stream terraces
Typical vegetation: Irrigated crops and pasture

Pardee and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 3 percent
Landform: Treads on fan remnants
Typical vegetation: Annual grasses and forbs

Peters and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

Unnamed soils that are ponded
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Drainageways
Typical vegetation: Not determined

Hicksville and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Treads on stream terraces
Typical vegetation: Irrigated crops and pasture

210—Pentz-Redding complex, 2 to 15 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills and alluvial plains
Elevation: 135 to 225 feet (42 to 70 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz loam—55 percent
Redding gravelly loam—25 percent
Minor components—20 percent

Characteristics of the Pentz Soil

Slope: 5 to 15 percent
Aspect: Northeast to southeast

Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.6
Surface area covered by coarse fragments: 0 to 3 percent rounded cobbles; 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.5 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 23.8 (revised method)

Typical profile
A—0 to 9 inches; loam
Bw—9 to 12 inches; silt loam
Bt—12 to 16 inches; silt loam
Cr—16 to 60 inches; soft or weathered bedrock

Characteristics of the Redding Soil

Slope: 2 to 5 percent
Aspect: Northeast to southeast
Landform: Treads on fan remnants
Parent material: Gravelly alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.8
Surface area covered by coarse fragments: 6 to 26 percent fine, subangular pebbles; 3 to 23 percent coarse, rounded pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 13 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.6 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None

Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 13.9 (revised method)

Typical profile
A—0 to 17 inches; gravelly loam
2Bt—17 to 25 inches; clay
3Btqm—25 to 60 inches; cemented, indurated material

Minor Components

Typic Durixerepts sandy loam and similar soils
Composition: About 6 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 5 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Hicksville clay loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

Typic Xerorthents, shallow, loam and similar soils
Composition: About 1 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

212—Peters clay, 2 to 8 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin

Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 150 to 255 feet (46 to 78 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Peters clay—85 percent
Minor components—15 percent

Characteristics of the Peters Soil

Slope: 2 to 8 percent
Aspect: Northeast to north
Landform: Base slopes
Parent material: Tuffaceous, clayey colluvium and residuum derived from volcanic sandstone
Typical vegetation: Annual grasses, forbs, and dryland grains

Selected properties and qualities
Surface pH: 7.1
Surface area covered by coarse fragments: 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles; 0 to 15 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.2 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 16.7 (revised method)

Typical profile
A1—0 to 6 inches; clay
A2—6 to 16 inches; clay
Cr—16 to 60 inches; soft or weathered bedrock

Minor Components

Pentz loam and similar soils
Composition: About 6 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Typic Durixerepts sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Archerdale loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 5 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Pachic Haploxerolls loam and similar soils
Composition: About 1 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

219—Redding loam, 0 to 3 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 95 to 1,495 feet (30 to 457 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Redding loam—85 percent
Minor components—15 percent

Characteristics of the Redding Soil

Slope: 0 to 3 percent
Aspect: South to east
Landform: Treads on fan remnants
Parent material: Gravelly, fine-loamy alluvium over clayey alluvium and over gravelly, coarse-loamy alluvium; all derived from mixed rock sources
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.8
Surface area covered by coarse fragments: 1 to 10 percent coarse, rounded pebbles; 1 to 15 percent fine, subangular pebbles; 0 to 3 percent rounded cobbles
Depth to restrictive feature: 13 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.9 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 3s
Land capability classification, nonirrigated: 4s
California Storie index: 19.6 (revised method)

Typical profile
A—0 to 13 inches; loam
2Bt—13 to 22 inches; clay
3Bqm—22 to 60 inches; cemented, indurated material

Minor Components

Keyes fine sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Bellota gravelly sandy loam and similar soils
Composition: About 4 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 4 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

220—Redding gravelly loam, 2 to 8 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 195 to 295 feet (60 to 90 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Redding gravelly loam—85 percent
Minor components—15 percent

Characteristics of the Redding Soil

Slope: 2 to 8 percent
Aspect: Southeast to north
Landform: Treads on fan remnants
Parent material: Gravelly, fine-loamy alluvium over clayey alluvium and over gravelly, coarse-loamy alluvium; all derived from mixed rock sources
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.5
Surface area covered by coarse fragments: 0 to 3 percent rounded cobbles; 3 to 23 percent medium, rounded pebbles; 6 to 26 percent fine, subangular pebbles
Depth to restrictive feature: 13 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.6 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Low
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 13.3 (revised method)

Typical profile
Ap—0 to 5 inches; gravelly loam
BA—5 to 17 inches; gravelly loam
2Bt—17 to 22 inches; clay
3Btqm—22 to 60 inches; cemented, indurated material

Minor Components

Keyes fine sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Bellota gravelly sandy loam and similar soils
Composition: About 4 percent of the map unit
Slope: 8 to 30 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 4 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

221—Redding gravelly loam, 8 to 30 percent slopes

Map Unit Setting

General location: Small areas along the San Joaquin County boundary
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 195 to 200 feet (60 to 61 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Redding gravelly loam—85 percent
Minor components—15 percent

Characteristics of the Redding Soil

Slope: 8 to 30 percent
Aspect: Southwest to east
Landform: Treads on fan remnants
Parent material: Gravelly, fine-loamy alluvium over clayey alluvium and over gravelly, coarse-loamy alluvium; all derived from mixed rock sources
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.8
Surface area covered by coarse fragments: 6 to 23 percent fine, subangular pebbles; 3 to 26 percent coarse, rounded pebbles; 0 to 9 percent rounded cobbles

Depth to restrictive feature: 13 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.6 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 12.6 (revised method)

Typical profile
A—0 to 13 inches; gravelly loam
2Bt—13 to 22 inches; clay
3Bqm—22 to 60 inches; cemented, indurated material

Minor Components

Pentz loam and similar soils
Composition: About 5 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Bellota gravelly sandy loam and similar soils
Composition: About 4 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Pardee gravelly loam and similar soils
Composition: About 3 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Typic Xerorthents, shallow, sandy loam and similar soils
Composition: About 2 percent of the map unit
Slope: 30 to 50 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

236—San Joaquin sandy loam, 0 to 2 percent slopes

Map Unit Setting

General location: Extensive areas along and to the south of Littlejohn Creek
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 215 to 255 feet (66 to 78 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

San Joaquin sandy loam—85 percent
Minor components—15 percent

Characteristics of the San Joaquin Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Treads on fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: None
Depth to restrictive feature: 11 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4s
Land capability classification, nonirrigated: 4s
California Storie index: 25.5 (revised method)

Typical profile
A—0 to 11 inches; sandy loam
2Bt—11 to 24 inches; clay
2Bqm—24 to 60 inches; cemented, indurated material

Minor Components

Exeter sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Madera sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Jahant loam and similar soils
Composition: About 3 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Cometa loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, vineyards, and pasture

Veritas fine sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops and pasture

237—San Joaquin sandy loam, 2 to 5 percent slopes

Map Unit Setting

General location: Extensive areas along and to the south of Littlejohn Creek
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 215 to 260 feet (66 to 80 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

San Joaquin sandy loam—85 percent
Minor components—15 percent

Characteristics of the San Joaquin Soil

Slope: 2 to 5 percent
Aspect: Southeast to north
Landform: Treads on fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: None
Depth to restrictive feature: 11 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Altered hydrology: A few areas are dissected by intermittent sloughs that have been filled by land leveling.
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 24.3 (revised method)

Typical profile
A—0 to 11 inches; sandy loam
2Bt—11 to 24 inches; clay
2Bqm—24 to 60 inches; cemented, indurated material

Minor Components

Cometa loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, vineyards, and pasture

Exeter sandy loam and similar soils
Composition: About 4 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Madera sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Jahant loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Veritas fine sandy loam and similar soils
Composition: About 1 percent of the map unit

Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops and pasture

241—San Joaquin complex, 0 to 1 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and south of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 140 to 150 feet (44 to 46 meters)
Mean annual precipitation: 13 to 15 inches (335 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

San Joaquin sandy loam—45 percent
San Joaquin, thick surface—40 percent
Minor components—15 percent

Characteristics of the San Joaquin Sandy Loam Soil

Slope: 0 to 1 percent
Aspect: South to north
Landform: Treads on fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: None
Depth to restrictive feature: 11 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4s
Land capability classification, nonirrigated: 4s
California Storie index: 26.8 (revised method)

Typical profile
A—0 to 11 inches; sandy loam
2Bt—11 to 24 inches; clay
2Bqm—24 to 60 inches; cemented, indurated material

Characteristics of the San Joaquin, Thick Surface, Soil

Slope: 0 to 1 percent
Aspect: South to north
Landform: Treads on fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: None
Depth to restrictive feature: 11 inches to an abrupt textural change; 20 to 40 inches to a duripan
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 3s
Land capability classification, nonirrigated: 4s
California Storie index: 25.5 (revised method)

Typical profile
A—0 to 15 inches; sandy loam
Bw—15 to 25 inches; sandy clay loam
2Bt—25 to 38 inches; clay
2Bqm—38 to 60 inches; cemented, indurated material

Minor Components

Exeter sandy loam and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Cometa loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, vineyards, and pasture

Madera sandy loam and similar soils
Composition: About 3 percent of the map unit

Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Jahant loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

266—Veritas fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas north of the Stanislaus River
Major uses: Irrigated row crops, orchards, field crops, and vineyards
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Alluvial plains
Elevation: 145 to 150 feet (45 to 46 meters)
Mean annual precipitation: 14 to 15 inches (355 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Veritas fine sandy loam—85 percent
Minor components—15 percent

Characteristics of the Veritas Soil

Slope: 0 to 2 percent
Aspect: South to west
Landform: Alluvial fans
Parent material: Coarse-loamy alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, and vineyards

Selected properties and qualities
Surface pH: 7.9
Surface area covered by coarse fragments: None
Depth to restrictive feature: 40 to 60 inches to a duripan
Slowest permeability class: Moderately rapid above the duripan
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 6.6 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Altered hydrology: Drainage systems and flood-control structures have altered the hydrology in some areas.
Present flooding: Rare
Present ponding: None
Surface runoff: Very low
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2s

Land capability classification, nonirrigated: 4s
California Storie index: 81.7 (revised method)

Typical profile
A—0 to 16 inches; fine sandy loam
Bw—16 to 47 inches; fine sandy loam
2Bqm—47 to 60 inches; indurated material

Minor Components

Exeter sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Honcut sandy loam and similar soils
Composition: About 5 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Madera sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops and pasture

Delhi loamy sand and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Sand sheets
Typical vegetation: Irrigated crops, orchards, and vineyards

Chuloak sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Irrigated crops, orchards, and vineyards

285—Peters clay, 0 to 2 percent slopes

Map Unit Setting

General location: Small areas along the northern part of the boundary between Stanislaus County and San Joaquin County and north of the Farmington Flood Control Basin
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 570 to 570 feet (174 to 175 meters)
Mean annual precipitation: 14 to 15 inches (355 to 370 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 250 days

Map Unit Composition

Peters clay—85 percent
Minor components—15 percent

Characteristics of the Peters Soil

Slope: 0 to 2 percent
Aspect: East to west
Landform: Base slopes
Parent material: Tuffaceous, clayey colluvium derived from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 7.1
Surface area covered by coarse fragments: 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles; 0 to 15 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.0 inches (very low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4s
Land capability classification, nonirrigated: 4s
California Storie index: 17.0 (revised method)

Typical profile
A1—0 to 6 inches; clay
A2—6 to 16 inches; clay
Cr—16 to 60 inches; soft or weathered bedrock

Minor Components

Typic Durixerepts sandy clay loam and similar soils
Composition: About 7 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 5 percent of the map unit
Slope: 5 to 8 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Archerdale loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hicksville loam and similar soils
Composition: About 1 percent of the map unit

Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

301—Archerdale-Hicksville association, 0 to 2 percent slopes

Map Unit Setting

General location: Moderately extensive areas along the upper reaches of creeks originating in foothills
Major uses: Livestock grazing and some irrigated pasture
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Valleys
Elevation: 160 to 310 feet (50 to 95 meters)
Mean annual precipitation: 14 to 15 inches (345 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 260 days

Map Unit Composition

Archerdale clay loam—65 percent
Hicksville silt loam—20 percent
Minor components—15 percent

Characteristics of the Archerdale Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Treads on stream terraces
Parent material: Clayey alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.7
Surface area covered by coarse fragments: 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles; 0 to 15 percent rounded cobbles
Restrictive feature: None noted
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 9.8 inches (high)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: Rare
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: C

Interpretive groups
Land capability classification, irrigated: 2s
Land capability classification, nonirrigated: 4s
California Storie index: 75.6 (revised method)

Typical profile
Ap—0 to 10 inches; clay loam
A—10 to 30 inches; clay
Bw—30 to 60 inches; clay

Characteristics of the Hicksville Soil

Slope: 0 to 2 percent
Aspect: Southeast to north
Landform: Treads on stream terraces
Parent material: Alluvium derived from igneous, metamorphic, and sedimentary rock
Typical vegetation: Irrigated crops and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: 1 to 6 percent coarse, rounded pebbles; 1 to 10 percent fine, subangular pebbles; 0 to 3 percent rounded cobbles
Restrictive feature: None noted
Slowest permeability class: Moderately slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 12.0 inches (very high)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Moderately well drained
Hydrologic soil group: B

Interpretive groups
Land capability classification, irrigated: 2w
Land capability classification, nonirrigated: 4w
California Storie index: 52.0 (revised method)

Typical profile
A—0 to 10 inches; silt loam
Bt—10 to 45 inches; gravelly sandy clay loam
2Bt—45 to 60 inches; stratified very gravelly sandy loam and very gravelly sandy clay loam

Minor Components

Hollenbeck clay and similar soils
Composition: About 7 percent of the map unit
Slope: 1 to 3 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Capay clay and similar soils
Composition: About 6 percent of the map unit
Slope: 0 to 2 percent

Landform: Backswamps
Typical vegetation: Irrigated crops

Finrod clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

Nord loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Flood plains
Typical vegetation: Irrigated crops, orchards, and vineyards

401—Peters-Pentz association, 2 to 8 percent slopes

Map Unit Setting

General location: Extensive areas along the upper reaches of creeks originating in foothills
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 195 to 410 feet (60 to 125 meters)
Mean annual precipitation: 13 to 15 inches (335 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 230 to 275 days

Map Unit Composition

Peters silty clay loam—60 percent
Pentz silt loam—25 percent
Minor components—15 percent

Characteristics of the Peters Soil

Slope: 2 to 5 percent
Aspect: East to north
Landform: Base slopes
Parent material: Tuffaceous, clayey colluvium derived from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 7.1
Surface area covered by coarse fragments: 1 to 8 percent fine, subangular pebbles; 0 to 16 percent rounded cobbles; 1 to 10 percent coarse, rounded pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.9 inches (very low)
Shrink-swell potential: Very high (LEP greater than 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium

Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 29.6 (revised method)

Typical profile
A1—0 to 2 inches; silty clay loam
A2—2 to 6 inches; silty clay
A3—6 to 14 inches; silty clay
Cr1—14 to 15 inches; paralithic material
Cr2—15 to 60 inches; weathered bedrock

Characteristics of the Pentz Soil

Slope: 5 to 8 percent
Aspect: East to north
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.7
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.5 inches (very low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 23.3 (revised method)

Typical profile
A—0 to 9 inches; silt loam
Bw—9 to 12 inches; silt loam
Bt—12 to 16 inches; silt loam
Cr—16 to 60 inches; soft or weathered bedrock

Minor Components

Typic Durixerepts sandy clay loam and similar soils
Composition: About 7 percent of the map unit
Slope: 2 to 5 percent

Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 3 percent of the map unit
Slope: 5 to 15 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Archerdale loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hicksville clay loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hollenbeck clay and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 3 percent
Landform: Backswamps
Typical vegetation: Irrigated crops

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

451—Pentz-Peters association, 2 to 15 percent slopes

Map Unit Setting

General location: Extensive areas in rangelands
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 130 to 375 feet (40 to 115 meters)
Mean annual precipitation: 13 to 15 inches (335 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz silt loam—60 percent
Peters silty clay loam—25 percent
Minor components—15 percent

Characteristics of the Pentz Soil

Slope: 5 to 15 percent
Aspect: Northeast to north
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.7
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 0 to 15 percent fine, subrounded pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.6 inches (very low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 19.1 (revised method)

Typical profile
A—0 to 6 inches; silt loam
Bw—6 to 10 inches; silt loam
Bt—10 to 12 inches; silt loam
Cr—12 to 60 inches; soft or weathered bedrock

Characteristics of the Peters Soil

Slope: 2 to 8 percent
Aspect: Northeast to north
Landform: Base slopes
Parent material: Tuffaceous, clayey colluvium derived from volcanic sandstone
Typical vegetation: Annual grasses, forbs, and dryland grains (fig. 4)

Selected properties and qualities
Surface pH: 7.1
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 0 to 15 percent medium, subrounded pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.9 inches (very low)
Shrink-swell potential: Very high (LEP greater than 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e

Figure 4.—An area of Peters soils in the middle foreground. A 3-foot long tile spade rests upon a gilgai knoll.

Land capability classification, nonirrigated: 4e
California Storie index: 28.1 (revised method)

Typical profile
A1—0 to 2 inches; silty clay loam
A2—2 to 6 inches; silty clay
A3—6 to 14 inches; silty clay
Cr1—14 to 15 inches; paralithic bedrock
Cr2—15 to 60 inches; weathered bedrock

Minor Components

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 4 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 3 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Typic Durixerepts sandy clay loam and similar soils
Composition: About 3 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Redding sandy loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Archerdale gravelly loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Pachic Haploxerolls loam and similar soils
Composition: About 1 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

452—Pentz-Peters-Cometa association, 2 to 15 percent slopes

Map Unit Setting

General location: Moderately extensive areas in rangelands from northeast to southeast of Woodward Reservoir
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills and alluvial plains
Elevation: 245 to 325 feet (75 to 100 meters)
Mean annual precipitation: 13 to 15 inches (335 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz silt loam—45 percent
Peters silty clay loam—25 percent
Cometa sandy loam—15 percent
Minor components—15 percent

Characteristics of the Pentz Soil

Slope: 5 to 15 percent
Aspect: Southeast to east
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.7
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock

Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.5 inches (very low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 22.9 (revised method)

Typical profile
A—0 to 9 inches; silt loam
Bw—9 to 12 inches; silt loam
Bt—12 to 16 inches; silt loam
Cr—16 to 60 inches; soft or weathered bedrock

Characteristics of the Peters Soil

Slope: 2 to 8 percent
Aspect: Southeast to east
Landform: Base slopes
Parent material: Tuffaceous, clayey colluvium derived from volcanic sandstone
Typical vegetation: Annual grasses, forbs, and dryland grains

Selected properties and qualities
Surface pH: 7.1
Surface area covered by coarse fragments: 1 to 8 percent fine, subangular pebbles; 0 to 15 percent rounded cobbles; 1 to 10 percent coarse, rounded pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.9 inches (very low)
Shrink-swell potential: Very high (LEP greater than 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 28.8 (revised method)

Typical profile
A1—0 to 2 inches; silty clay loam

A2—2 to 6 inches; silty clay
A3—6 to 14 inches; silty clay
Cr1—14 to 15 inches; paralithic material
Cr2—15 to 60 inches; weathered bedrock

Characteristics of the Cometa Soil

Slope: 2 to 8 percent
Aspect: Southeast to east
Landform: Treads on fan remnants
Parent material: Clayey alluvium derived from granite
Typical vegetation: Irrigated crops, orchards, vineyards, and pasture

Selected properties and qualities
Surface pH: 6.1
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 1 to 10 percent coarse, rounded pebbles; 1 to 8 percent fine, subangular pebbles
Depth to restrictive feature: 40 to 60 inches to a cemented horizon
Slowest permeability class: Impermeable
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 3.1 inches (low)
Shrink-swell potential: High (LEP 6 to 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: High
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 60.4 (revised method)

Typical profile
A—0 to 15 inches; sandy loam
Bt—15 to 40 inches; clay loam
Btq—40 to 60 inches; sandy loam

Minor Components

Typic Durixerepts sandy clay loam and similar soils
Composition: About 6 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 4 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 2 percent of the map unit
Slope: 8 to 30 percent

Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Archerdale clay loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Hicksville loam and similar soils
Composition: About 1 percent of the map unit
Slope: 0 to 2 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Redding sandy loam and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

475—Pentz-Peters association, 2 to 50 percent slopes

Map Unit Setting

General location: Extensive areas in rangelands
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 130 to 375 feet (40 to 115 meters)
Mean annual precipitation: 13 to 15 inches (335 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Pentz silt loam—60 percent
Peters silty clay loam—25 percent
Minor components—15 percent

Characteristics of the Pentz Soil

Slope: 15 to 50 percent
Aspect: Northeast to north
Landform: Side slopes
Parent material: Tuffaceous, loamy residuum weathered from volcanic sandstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.7
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 0 to 15 percent fine, subrounded pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.5 inches (very low)
Shrink-swell potential: Moderate (LEP 3 to 6)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 17.4 (revised method)

Typical profile
A—0 to 9 inches; silt loam
Bw—9 to 12 inches; silt loam
Bt—12 to 16 inches; silt loam
Cr—16 to 60 inches; soft or weathered bedrock

Characteristics of the Peters Soil

Slope: 2 to 8 percent
Aspect: Northeast to north
Landform: Base slopes
Parent material: Tuffaceous, clayey colluvium derived from volcanic sandstone
Typical vegetation: Annual grasses, forbs, and dryland grains

Selected properties and qualities
Surface pH: 7.1
Surface area covered by coarse fragments: 0 to 15 percent rounded cobbles; 0 to 15 percent medium, subrounded pebbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Slow
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 1.9 inches (very low)
Shrink-swell potential: Very high (LEP greater than 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 4e
California Storie index: 28.1 (revised method)

Typical profile
A1—0 to 2 inches; silty clay loam
A2—2 to 6 inches; silty clay
A3—6 to 14 inches; silty clay
Cr1—14 to 15 inches; paralithic material
Cr2—15 to 60 inches; weathered bedrock

Minor Components

Ultic Haploxerolls, clayey-skeletal, gravelly loam and similar soils
Composition: About 4 percent of the map unit
Slope: 8 to 30 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Typic Durixerepts sandy clay loam and similar soils
Composition: About 3 percent of the map unit
Slope: 2 to 5 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Archerdale gravelly loam and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 8 percent
Landform: Stream terraces
Typical vegetation: Irrigated crops and pasture

Pentz loam and similar soils
Composition: About 2 percent of the map unit
Slope: 5 to 15 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Redding sandy loam and similar soils
Composition: About 2 percent of the map unit
Slope: 0 to 2 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Pachic Haploxerolls loam and similar soils
Composition: About 1 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

551—Amador sandy loam, 5 to 15 percent slopes

Map Unit Setting

General location: Small areas in rangelands along the northern part of the boundary between Stanislaus County and Calaveras County
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 245 to 425 feet (75 to 130 meters)
Mean annual precipitation: 14 to 15 inches (345 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Amador sandy loam—85 percent
Minor components—15 percent

Characteristics of the Amador Soil

Slope: 5 to 15 percent
Aspect: East to northwest
Landform: Side slopes
Parent material: Tuffaceous, loamy colluvium derived from pyroclastic rock
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 4.5
Surface area covered by coarse fragments: 0 to 15 percent fine, subangular pebbles; 0 to 15 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.1 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 6.0 (revised method)

Typical profile
A—0 to 4 inches; sandy loam
Bw—4 to 15 inches; loam
Cr—15 to 60 inches; soft or weathered bedrock

Minor Components

Typic Durixerepts gravelly loam and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Annual grasses and forbs

Typic Xerorthents, shallow, loam and similar soils
Composition: About 3 percent of the map unit
Slope: 5 to 15 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Auburn loam and similar soils
Composition: About 2 percent of the map unit
Slope: 5 to 15 percent

Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 2 percent of the map unit
Slope: 5 to 15 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 2 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

575—Amador loam, 8 to 30 percent slopes

Map Unit Setting

General location: Small areas in rangelands along the northern part of the boundary between Stanislaus County and Calaveras County
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 260 to 425 feet (80 to 130 meters)
Mean annual precipitation: 14 to 15 inches (345 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Amador loam—85 percent
Minor components—15 percent

Characteristics of the Amador Soil

Slope: 8 to 30 percent
Aspect: East to northwest
Landform: Side slopes
Parent material: Tuffaceous, loamy colluvium derived from pyroclastic rock
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 4.5
Surface area covered by coarse fragments: 0 to 15 percent fine, subangular pebbles; 0 to 15 percent rounded cobbles
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Slowest permeability class: Moderately slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.3 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 6.5 (revised method)

Typical profile
A—0 to 4 inches; loam
Bw—4 to 16 inches; loam
C—16 to 60 inches; weathered bedrock

Minor Components

Typic Xerorthents, shallow, loam and similar soils
Composition: About 7 percent of the map unit
Slope: 15 to 50 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 3 percent of the map unit
Slope: 15 to 50 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 3 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

Auburn loam and similar soils
Composition: About 1 percent of the map unit
Slope: 15 to 30 percent
Landform: Backslopes and summits
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 5 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

751—Auburn silt loam, 5 to 15 percent slopes

Map Unit Setting

General location: Moderately extensive areas in rangelands along the length of the boundary between Stanislaus County and Calaveras County
Major uses: Livestock grazing
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills

Elevation: 295 to 490 feet (90 to 150 meters)
Mean annual precipitation: 14 to 15 inches (345 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Auburn silt loam—85 percent
Minor components—15 percent

Characteristics of the Auburn Soil

Slope: 5 to 15 percent
Aspect: Southeast to northwest
Landform: Side slopes
Parent material: Loamy colluvium derived from mica schist
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.6
Surface area covered by coarse fragments: 0 to 15 percent subangular cobbles; 0 to 15 percent medium, subangular pebbles
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Slowest permeability class: Very slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.1 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 28.3 (revised method)

Typical profile
A—0 to 6 inches; silt loam
Bw—6 to 16 inches; gravelly silt loam
R—16 to 60 inches; bedrock

Minor Components

Mollic Haploxeralfs silt loam and similar soils
Composition: About 7 percent of the map unit
Slope: 15 to 50 percent
Landform: Side slopes
Typical vegetation: Annual grasses and forbs

Typic Haploxerolls clay and similar soils
Composition: About 4 percent of the map unit
Slope: 2 to 5 percent
Landform: Toeslopes and footslopes
Typical vegetation: Annual grasses and forbs

Lithic Xerorthents loam and similar soils
Composition: About 2 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Amador loam and similar soils
Composition: About 1 percent of the map unit
Slope: 5 to 15 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

775—Auburn silt loam, 15 to 50 percent slopes

Map Unit Setting

General location: Small areas in rangelands along the southern part of the boundary between Stanislaus County and Calaveras County
Major uses: Livestock grazing
Major land resource area: 18—Sierra Nevada Foothills
Landscape position: Hills
Elevation: 490 to 605 feet (150 to 185 meters)
Mean annual precipitation: 15 to 17 inches (370 to 420 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 245 to 265 days

Map Unit Composition

Auburn silt loam—85 percent
Minor components—15 percent

Characteristics of the Auburn Soil

Slope: 15 to 50 percent
Aspect: East to northwest
Landform: Side slopes
Parent material: Loamy colluvium derived from mica schist
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 5.6
Surface area covered by coarse fragments: 0 to 15 percent medium, subangular pebbles; 0 to 15 percent subangular cobbles
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Slowest permeability class: Very slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 2.1 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present flooding: None
Present ponding: None

Surface runoff: Medium
Current water table: None noted
Natural drainage class: Well drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 4e
Land capability classification, nonirrigated: 6e
California Storie index: 23.9 (revised method)

Typical profile
A—0 to 6 inches; silt loam
Bw—6 to 16 inches; gravelly silt loam
R—16 to 60 inches; bedrock

Minor Components

Mollic Haploxeralfs silt loam and similar soils
Composition: About 7 percent of the map unit
Slope: 15 to 50 percent
Landform: Side slopes
Typical vegetation: Annual grasses and forbs

Typic Haploxerolls clay and similar soils
Composition: About 4 percent of the map unit
Slope: 2 to 5 percent
Landform: Footslopes and toeslopes
Typical vegetation: Annual grasses and forbs

Lithic Xerorthents fine sandy loam and similar soils
Composition: About 3 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Rock outcrop
Composition: About 1 percent of the map unit
Landform: None assigned
Typical vegetation: Not determined

851—Mckeonhills clay, 5 to 15 percent slopes

Map Unit Setting

General location: Small areas in rangelands along the north-central part of the boundary between Stanislaus County and Calaveras County
Major uses: Livestock grazing and dryland grain crops
Major land resource area: 17—Sacramento and San Joaquin Valleys
Landscape position: Hills
Elevation: 245 to 455 feet (75 to 140 meters)
Mean annual precipitation: 14 to 15 inches (345 to 380 millimeters)
Mean annual air temperature: 61 to 63 degrees F (16 to 17 degrees C)
Frost-free period: 255 to 275 days

Map Unit Composition

Mckeonhills clay—85 percent
Minor components—15 percent

Characteristics of the Mckeonhills Soil

Slope: 5 to 15 percent
Aspect: Southeast to northwest
Landform: Side slopes
Parent material: Calcareous, clayey colluvium derived from mudstone
Typical vegetation: Annual grasses and forbs

Selected properties and qualities
Surface pH: 8.0
Surface area covered by coarse fragments: 0 to 2 percent rounded cobbles and stones
Depth to restrictive feature: 20 to 40 inches to dense material
Slowest permeability class: Slow above the bedrock
Salinity: Not saline
Sodicity: Not sodic
Available water capacity to a depth of 60 inches: About 5.5 inches (moderate)
Shrink-swell potential: Very high (LEP greater than 9)

Selected hydrologic properties
Present flooding: None
Present ponding: None
Surface runoff: Medium
Current water table: None noted
Natural drainage class: Poorly drained
Hydrologic soil group: D

Interpretive groups
Land capability classification, irrigated: 2e
Land capability classification, nonirrigated: 3e
California Storie index: 22.3 (revised method)

Typical profile
A—0 to 4 inches; clay
Bk—4 to 19 inches; clay
Bkss—19 to 39 inches; clay
Cr—39 to 60 inches; soft or weathered bedrock

Minor Components

Aridic Haploxerolls, deep, clay and similar soils
Composition: About 5 percent of the map unit
Slope: 2 to 8 percent
Landform: Footslopes
Typical vegetation: Annual grasses and forbs

Typic Haploxerolls clay and similar soils
Composition: About 5 percent of the map unit
Slope: 15 to 30 percent
Landform: Shoulders
Typical vegetation: Annual grasses and forbs

Aridic Haploxerolls, very deep, clay and similar soils
Composition: About 3 percent of the map unit
Slope: 0 to 5 percent
Landform: Toeslopes
Typical vegetation: Annual grasses and forbs

Amador loam and similar soils
Composition: About 1 percent of the map unit
Slope: 5 to 15 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Pentz loam and similar soils
Composition: About 1 percent of the map unit
Slope: 5 to 15 percent
Landform: Summits and backslopes
Typical vegetation: Annual grasses and forbs

Peters clay and similar soils
Composition: About 1 percent of the map unit
Slope: 2 to 8 percent
Landform: Base slopes
Typical vegetation: Annual grasses, forbs, and dryland grains

999—Water

Map Unit Composition

Water—100 percent

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use. In some of the tables, the terms for the limitation classes are *not limited, somewhat limited,* and *very limited.* In other tables, the terms are *limitations* and *no limitations.*

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one

limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

For component horizon data, see the “Soil Properties” section of this publication. A description of typical soils with a range in characteristics is included, in alphabetical order, in the “Classification of the Soils” section.

Crops and Pasture

By John C. Rule, soil survey project leader, Natural Resources Conservation Service

General management needed for crops and pasture is suggested in this section. The estimated yields and common management practices for the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Soils influence the crops and pasture plants that can be grown in an area. The climate of the northern part of Stanislaus County enables the growth of a broad variety of plants. The hazard of winter frost, however, affects the growth of semitropical fruits, such as citrus, which cannot be grown because of early autumnal rainfall and cool temperatures.

A wide variety of soils support irrigated field crops in the survey area. Wheat, corn, and corn silage are grown on soils on low fan remnants. Examples are Exeter, Madera, and San Joaquin soils, which are moderately deep to a hardpan. The conservation practices necessary for long-term productivity vary on these soils. San Joaquin soils respond favorably to chiseling, careful water management, and nutrient inputs. Alfalfa grows best on very deep, well drained soils, such as Cogna soils. Stands of alfalfa on soils that are moderately deep to a hardpan have relatively low yields and exhibit diminished longevity. Examples are Madera and San Joaquin soils.

Vegetables are grown on very deep soils, such as Cogna and Nord soils. Chiseling is commonly used to break up compacted layers. Vegetable crops are commonly grown in rotation with field crops to improve tilth and control diseases. Portable irrigation systems are used to germinate processing tomatoes. As the crop becomes established, the portable systems are replaced by furrow irrigation.

Clover and sudangrass are grown for seed on some low fan remnants. Examples of soils in these areas are Exeter, Madera, and San Joaquin soils. The areas are irrigated by systems that include graded borders. Chiseling and careful water management are needed.

Dryland field crops are grown on Cometa and San Joaquin soils. These soils have undulating or irregular slopes that range from 2 to 8 percent. Water erosion is a hazard in cultivated areas. Crops can be damaged by runoff, and sediment that can accumulate in low areas. Good management measures, such as crop residue management, can help to control erosion in most areas.

Fruit and nut crops grow best on very deep, coarse to medium textured soils, such as Cogna, Columbia, Honcut, and Nord soils. In some parts of the survey area, wine grapes are grown on soils that are moderately deep to a hardpan. Examples are Exeter, Madera, and San Joaquin soils. In places, slip plowing or ripping has improved the internal drainage of these soils. Many types of irrigation are used. Sprinkler irrigation is the most common. Perennial cover crops are grown to improve water infiltration, reduce the hazard of erosion, remove excess water, and improve accessibility in winter and between irrigation periods.

Pasture plants grow well on a broad variety of soils and are commonly grown on soils that are moderately deep to a hardpan. Examples are Exeter and Madera soils. Some areas that were formerly used as pasture are now used to grow silage crops for the dairy industry. Rotational grazing, water management, and nutrient applications are key management practices.

Management Practices

The management practices needed in the survey area include, but are not limited to, chiseling and subsoiling, conservation cropping systems, conservation tillage, cover crops, crop residue management, land leveling, irrigation water management, subsurface drainage, control of surface water, hayland management, and pasture management. Some of the terms used in this section are defined in the Glossary.

Chiseling and subsoiling are used to increase the effective rooting depth in soils that have a plowpan. Chiseling the plowpan improves permeability and internal drainage, helps to prevent a perched water table, and allows deeper root penetration. Chiseling is temporarily beneficial on clayey soils, such as Capay, Clear Lake, and Finrod soils, but these soils may rapidly return to their original condition. Applying a system of conservation tillage can significantly reduce the need for chiseling.

A *conservation cropping system* consists of an established sequence of crops in combination with certain cultural and management practices. A successful cropping system is achieved if the crops and practices provide benefits that more than offset the effects of soil-depleting crops and deteriorating practices. Crop rotations are recommended for all tilled soils in the survey area and are important for pest management. Management practices on irrigated cropland include rotation of various row and field crops, return of crop residue to the soil, use of cover crops of grasses and legumes, adequate applications of fertilizer, and control of weeds and pests. One common crop rotation is corn and small grain; another is beans, tomatoes, and alfalfa.

Conservation tillage involves minimizing the number of operations necessary to prepare a seedbed, plant a crop, and control weeds. Suitable methods of conservation tillage for the crops, such as cotton and processing tomatoes, grown in the survey area are being developed and adopted. Excessive tillage operations tend to break down soil structure, cause compaction, reduce the amount of organic matter in the soil, and create a plowpan below the tilled layer. These conditions increase particle and tailpipe emission, increase the hazard of erosion, decrease the water intake capability of the soil, decrease the content of organic matter, and restrict root penetration. Combining tillage operations to minimize the number of trips over a field and delaying tillage operations while the soils are wet help to maintain tilth, prevent excessive compaction, and conserve energy. Conservation tillage is particularly beneficial on Capay, Clear Lake, and Hollenbeck soils.

Cover crops are beneficial in orchards and vineyards and on soils left fallow during the rainy season. Cover crops help to maintain or increase the rate of water infiltration, improve winter access for cultural operations, and help to control erosion in sloping areas. They also reduce the amount of dust in the air and thus improve working conditions and help to control spider mites. Mowing the cover crop to a height of 2 to 4 inches in late winter or early spring reduces the likelihood of frost damage to cold-sensitive crops. After mowing, the cover crop should be allowed to produce seed.

Crop residue management consists of returning crop residue to the soil or allowing it to remain on the soil surface. The residue helps to maintain tilth, the content of organic matter, and fertility and reduces the hazard of erosion. On soils that have slopes of more than 2 percent, such as Cometa sandy loam, 2 to 8 percent slopes,

and on soils that are subject to wind erosion, such as Delhi loamy sand, 0 to 2 percent slopes, crop residue left on or near the surface helps to control erosion during critical periods. Organic matter influences the development and stabilization of soil structure and the general physical environment of the soil, increasing the rate of water infiltration and the available water capacity.

Crop residue should seldom be burned or removed. Amendments that have a high content of organic matter generally are beneficial. Care should be taken to maintain a ratio of carbon to nitrogen that is low enough for nitrogen to remain available to the crop.

High-residue crops, such as corn, barley, and wheat, can help to compensate for the absence of nitrogen in lower residue crops, such as tomatoes and sugar beets. Other excellent organic sources of nitrogen are prunings from orchards and vineyards, animal manure, grasses, and legumes. When organic sources of nitrogen are insufficient to meet the anticipated requirement of nitrogen for a crop, a fertilizer program that includes nitrogenous amendments can be established.

Land leveling is necessary to conserve water in irrigated areas. It helps to ensure that irrigation water is applied uniformly to the entire field and that the field does not have any wet swales or dry ridges. It permits better field arrangements that conserve labor, time, and energy. Following the initial leveling of a field, the first crop planted should be an annual. Growing an annual crop gives the filled areas a chance to settle. The field can be smoothed before a longer-living crop is planted.

Accurate land leveling is important. Laser-guided equipment can be used to produce a very uniform grade. Significant benefits can be realized by re-leveling periodically and by re-leveling fields that were leveled without the aid of laser equipment.

Irrigation water management is achieved by controlling the rate, timing, and amount of water applied. Irrigation water management ensures that the needs of the crop are met in a planned and efficient manner. It results in the efficient use of the available water in the soil, minimizes erosion, helps to prevent costly water losses, and protects water quality. The irrigation methods used in this survey area are furrow, border, basin, sprinkler, microsprinkler, and trickle systems.

Furrow and sprinkler systems are the most common irrigation methods in the area. They are limited to level and nearly level areas. Microsprinkler and trickle irrigation systems are common in orchards. The use of subirrigation with a drip system is increasing for vegetables, such as peppers and fresh market tomatoes.

Subsurface drainage can be improved by constructing open drainage ditches or tile drains. Proper methods of drainage water removal are needed to dispose of any poor-quality water that is collected by the drainage system. High-quality ground water should be protected from possible pollution by low-quality drainage water.

Control of surface water is needed where water from rainfall or irrigation is a problem in low areas, in areas adjacent to levees, and at the lower end of irrigated fields. Excess surface water reduces crop yields. It can be controlled by land shaping and grading, open drainage ditches, maintenance of the existing natural drainageways, land leveling, irrigation tailwater recovery systems, and irrigation water management. Among the soils that require control of surface water are Capay, Clear Lake, and Finrod soils.

Hayland management is needed to protect irrigated hayland, achieve maximum production, maintain a desirable plant community, and extend the life of the planting. The practices needed in a hayland management program include irrigation water management, applications of fertilizer, and proper timing of mowing and baling activities, which should be carried out when the soils are firm and dry enough to support a load.

When irrigated hay crops are established, seed should be planted into a firm seedbed early in fall or in spring. The first mowing should be delayed until the plants

are well established. The spacing of borders on flood-irrigated hayland should be in multiples of the cutting width of the mower that will be used.

Pasture management is needed to prevent soil deterioration, allow maximum production, maintain a desirable plant community, and extend the life of pastures. The practices used in an irrigated pasture management program include managing irrigation water, rotating grazing, applying nutrients, harrowing or dragging to scatter animal droppings, mowing as necessary to maintain uniform growth, and controlling weeds. Grazing is not recommended during irrigation runs or when the soil is otherwise wet.

When a pasture is established, selection of a suitable plant mixture is important. On most soils in the survey area, mixtures that include a perennial grass and either trefoil or other clover can produce an abundance of high-quality forage. Annual pastures should be managed so that the plants produce enough seed to maintain a good stand.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (USDA–SCS, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or

cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the section “Detailed Soil Map Units” and in table 5.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 11,000 acres in the survey area, or more than 10 percent of the total acreage, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available. Most of the prime farmland is in the southwestern part of the survey area, mainly in general soil map units 1 and 2, which are described under the heading “General Soil Map Units.” Almost all of the prime farmland is used for irrigated crops.

A recent trend in land use in some parts of general soil map units 1 and 2 north of Oakdale has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective

measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

California Storie Index

By Anthony “Toby” O’Geen, Ph.D., soils extension specialist, University of California, Davis, and Susan Southard, soil scientist, Natural Resources Conservation Service

The Storie Index is a widely known and accepted method of rating soils for land use and productivity in California (Storie, 1978). Ratings are generated from a broad range of soil characteristics and landscape characteristics and are listed in table 7 and in the detailed map unit descriptions. Historically, Storie Index ratings were “hand generated” by the soil survey staff and collaborators. These ratings could be highly subjective because a single person did not generate the ratings for the entire state and because of inherent biases associated with the classification system. To reduce the subjectivity, the Revised Storie Index was developed and is used in the National Soils Information System (NASIS) to compute the ratings (O’Geen and Southard, 2005).

The Revised Storie Index uses combinations of discrete and fuzzy logic functions to obtain scores for the factors associated with the Storie Index (Cox, 1999). Subjectivity can be minimized and ratings can be generated in a timely and consistent manner using modeled criteria in NASIS.

The Storie Index assesses the productivity of a soil from four characteristics. Factor A is the degree of soil profile development. Factor B is the texture of the surface layer. Factor C is slope. Factor X is manageable features, including drainage, microrelief, fertility, acidity, erosion, and salt content. A score ranging from 0 to 100 percent is determined for each factor, and the scores are then multiplied together to derive an index rating (Storie, 1932 and 1978). Map units with more than one major component can have a Storie Index based on a weighted average of the soil component percentages. Users may chose to select this rating or a rating based solely on the major soil component or on the best rating in the map unit.

Factor A—Soil profile development

Factor A assesses potential productivity using the degree of soil development. For alluvial soils, the score decreases progressively with increasing soil development and/or presence of root restricting layers. Deep, well drained, alluvial soils are rated 100. An otherwise similar soil with a restrictive horizon, such as a claypan or hardpan, is rated much lower. For soils derived from bedrock, scoring is based on depth to a lithic or paralithic contact.

The main data sets in NASIS used to model factor A are soil taxonomy and landform. Interpretive criteria implied in the Storie Profile Group (Factor A) rely on the taxonomy of the soil in NASIS (Soil Survey Staff, 1999). In all situations, the upper limit of the scoring range in Storie (1978) is used for each soil profile group. For example, an Entisol formed on the valley floor is rated 100, whereas a Durixeralf on an old terrace with depth to pan of less than 1 foot is rated 80. The fuzzy logic rule “more is better” in reference to soil depth is used to revise the upper limit of the score based on the depth to the restrictive horizon.

Factor B—Surface texture

Factor B is based on the texture of the surface layer. Loamy soils receive the highest ratings. Clay-rich and sandy soils receive lower ratings. Content of rock fragments is used to modify the scores, which range from 10 to 100 percent.

Crisp values are assigned for the textural classes according to Storie (1978). The following textures were not listed in the original Storie Index publication and were added and assigned ratings by the authors: silty clay, clay, coarse sand, very fine

sandy loam, sandy clay, loamy coarse sand, loamy fine sand, loamy very fine sand, and silt. Currently, the model used in NASIS to generate Storie ratings does not rate in-lieu-of-textures because they were not addressed in the original Storie Index. All ratings for textural class are modified based on content of rock fragments using the fuzzy logic rule "less is better." The fuzzy score for content of rock fragments is then used to weight the score for factor B. For example, a soil with a texture of silt loam and 0% rock fragments receives a score of 100, whereas a soil with a texture of very gravelly silt loam and 45 percent rock fragments receives a score weighted proportionally to the amount of coarse fragments.

Factor C—Slope

Factor C is based on steepness of slope. Nearly level to gently sloping soils (0 to 8 percent slope) receive high scores, ranging from 85 to 100. Moderately sloping to strongly sloping soils (9 to 30 percent slopes) receive scores ranging from 70 to 95. Steep slopes (greater than 30 percent) receive much lower scores, ranging from 5 to 50.

Slope classes in NASIS are also scored using the fuzzy logic rule set "less is better." This function reduces the subjectivity associated with choosing a score from the range of scores within each factor. For example, the original Factor C had slope categories with scores that range from 100 "nearly level" to 5 "very steep" (Storie, 1978).

Factor X—Manageable features

Factor X focuses on soil and landscape characteristics, exclusive of the soil profile, that require special management considerations. The characteristics considered are content of salt, acidity, erodibility, fertility, drainage, and microrelief.

Data elements stored in NASIS, such as drainage class, erosion class, microrelief, flooding, and ponding, were used to model the hydrologic and physical properties associated with the X factor. Toxic thresholds were established for electrical conductivity, sodium adsorption ratio, and pH. The thresholds defined adverse chemical properties used for the X factor. Optimum soil pH was used to characterize fertility. Fuzzy rule sets were implemented in NASIS to model chemical and fertility attributes associated with the X factor. A "less is better curve" was used to score erosion and salt-affected soils. Crisp values were assigned to hydrologic properties.

Storie grades

Named components in map units are assigned grades according to their suitability for general intensive agriculture as shown by their Storie Index rating. The six grades and their range in index ratings are:

Grade 1—80 to 100
Grade 2—60 to 79
Grade 3—40 to 59
Grade 4—20 to 39
Grade 5—10 to 19
Grade 6—less than 10

Grade 1 soils are well suited to intensively grown, irrigated crops that are climatically adapted to the region.

Grade 2 soils are good agriculture soils, although they are not as desirable as soils in grade 1 because of a less permeable subsoil, deep cemented layers (duripans), a gravelly or moderately fine textured surface layer, moderate or strongly sloping slopes, restricted drainage, low available water capacity, lower soil fertility, or a slight or moderate hazard of flooding.

Grade 3 soils are only fairly well suited to agriculture because of moderate soil depth; moderate to steep slopes; restricted permeability in the subsoil; a clayey,

sandy, or gravelly surface layer; somewhat restricted drainage; acidity; low fertility; or a hazard of flooding.

Grade 4 soils are poorly suited to agriculture. They have a more limited agricultural potential than the soils in grade 3 because of a shallower depth; steeper slopes; poorer drainage; a less permeable subsoil; a gravelly, sandy, or clayey surface layer; channeled or hummocky microrelief; or acidity.

Grade 5 soils are very poorly suited to agriculture and are seldom cultivated. They are more commonly used as pasture, rangeland, or woodland.

Grade 6 soils and miscellaneous areas are not suited to agriculture because of very severe or extreme limitations. They are better suited to limited use as rangeland, protective habitat, woodland, or watershed.

The Storie Index was neither designed nor intended to be used in a regulatory manner.

Recreational Development

The soils of the survey area are rated in tables 8a and 8b according to limitations that affect their suitability for recreational uses. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *No limitations* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0.0 and 1.0 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1.0 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 8a and 8b can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of

camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, roadfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 9a and 9b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and shallow excavations.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *No limitations* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0.0 and 1.0 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1.0 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special

design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Sanitary Facilities

Tables 10a and 10b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *No limitations* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0.0 and 1.0 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1.0 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily

with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 11 shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk

density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Construction Materials

Tables 12a and 12b give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated as a *good source, fair source,* or *poor source* for gravel and sand. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel or sand. A rating of 0.00 to 0.07 indicates that the layer is a poor source. A rating of 0.75 to 1.00 indicates that the layer is a good source. A rating of 0.08 to 0.74 indicates a varying degree to which the layer is a likely source.

The soils are also rated as a *good source, fair source,* or *poor source* for topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12a, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of gravel or sand are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material,

and the content of rock fragments. If the bottom layer of the soil contains gravel or sand, the soil is considered a likely source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In table 12b, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 13 provides information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *No limitations* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0.0 and 1.0 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1.0

indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering properties, physical properties, chemical properties, erosion properties, soil features, and water features.

Engineering Properties

Table 14 gives the engineering classifications and the range of properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical Soil Properties

Table 15 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 15, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (Ksat). The estimates in the table indicate the rate of water movement, in micrometers per second (µm/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the

volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is *low* if the soil has a linear extensibility of less than 3 percent; *moderate* if 3 to 6 percent; *high* if 6 to 9 percent; *and very high* if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Chemical Soil Properties

Table 16 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Erosion Properties

Erosion factors are shown in table 17 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The wind erodibility groups are described in the National Soil Survey Handbook, which is available at the local office of the Natural Resources Conservation Service and on the Internet (http://soils.usda.gov/).

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, the content of rock fragments and organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Water Features

Table 18 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 18 indicates, by month, depth to the top *(upper limit)* and base *(lower limit)* of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 18 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 19 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Laboratory Testing

Samples were taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics. Standard procedures were followed (USDA–NRCS, 1996). The laboratory data are available online at http://ssldata.nrcs.usda.gov/querypage.asp.

The following procedure to obtain the data is effective as of June 2007:

Go to http://ssldata.nrcs.usda.gov/querypage.asp and fill out the form as follows.

Country: United States (US)
State Admin Div: California (CA)
County: Stanislaus (CA099)

Check the “Lab Pedon Number” box.

In the box to the right of “Lab Pedon Number,” enter the lab pedon number for the soil of interest.

Soil	Lab pedon number
Amador	05N0394
Auburn	05N0395
Mckeonhills	05N0392
Pentz	05N0396
Peters	05N0397
Redding	05N0393

Click on the “Execute Query” button.
A new screen will load. Check the box to the left of the pedon number.
Click on the “Continue” button.
Select “Primary Characterization Report” from the list.
Click on the “Get Report” button.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2003). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeroll (*Xer*, meaning dry, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxerolls (*Haplo*, meaning minimal horizonation, plus *xeroll*, the suborder of the Mollisols that has a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haploxerolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, superactive, thermic Typic Haploxerolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is the Veritas series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2003). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

Alamo Series

The Alamo series consists of poorly drained soils that are moderately deep over a duripan and are in drainageways on fan remnants. These soils formed in clayey alluvium derived from mixed rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Fine, smectitic, thermic Typic Duraquolls

Typical Pedon

Alamo clay, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 49 minutes, 25 seconds N. and long. 120 degrees, 50 minutes, 51 seconds W.; USGS Oakdale topographic quadrangle, NAD 27.

Ap—0 to 10 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure; hard, firm, moderately sticky and very plastic; many very fine roots; few fine and very fine dendritic tubular pores; few fine distinct yellowish brown (10YR 5/4, moist) masses of oxidized iron; neutral (pH 7.0); gradual smooth boundary.

Bw1—10 to 24 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; massive; very hard, firm, moderately sticky and very plastic; common very fine roots; few very fine dendritic tubular pores; few fine prominent black (10YR 2/1, moist) manganese concretions; slightly alkaline (pH 7.6); clear smooth boundary.

Bw2—24 to 34 inches; dark gray (10YR 4/1) clay, very dark grayish brown (10YR 3/2) moist; massive; hard, firm, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few fine prominent black (10YR 2/1, moist) manganese concretions; moderately alkaline (pH 8.2); abrupt wavy boundary.

2Bkqm—34 to 60 inches; variegated 60 percent pale brown (10YR 6/3) and 40 percent brown (10YR 4/3) strongly cemented duripan, dark brown (10YR 4/3) moist; extremely hard; few fine prominent pinkish white (7.5YR 8/2) carbonate coats; slightly effervescent.

Range in Characteristics

Depth to a duripan ranges from 20 to 40 inches.

The Ap horizon has dry color of 10YR 4/1, 5/1, or 5/2 and moist color of 10YR 3/1 or 3/2. Redoximorphic features are distinct or prominent. Reaction ranges from slightly acid to slightly alkaline.

The Bw horizon has dry color of 10YR 4/1 or 5/1 and moist color of 10YR 3/1, 3/2, 4/1, or 4/2. Reaction ranges from neutral to moderately alkaline.

The 2Bkqm horizon is strongly cemented, very strongly cemented, or indurated and has thin laminar caps. Accumulations of segregated carbonates are present as soft masses or as seams.

Amador Taxadjunct

The Amador taxadjunct consists of shallow, well drained soils on hillslopes on pyroclastic flows. These soils formed in residuum and colluvium derived from tuffaceous, pyroclastic rock. Slopes range from 5 to 30 percent.

Taxonomic class: Loamy, mixed, active, thermic, shallow Typic Dystroxerepts

Typical Pedon

Amador loam, 8 to 30 percent slopes; Stanislaus County, California; about 630 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 1 N., R. 11 E., Mount Diablo Base and Meridian; lat. 37 degrees, 57 minutes, 14 seconds N. and long. 120 degrees, 48 minutes, 51 seconds W.; USGS Bachelor Valley topographic quadrangle, NAD 27.

A—0 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate thin platy structure; very hard, friable, nonsticky and slightly plastic; common fine and very fine roots; common medium tubular pores; 7 percent gravel; very strongly acid (pH 4.5); clear smooth boundary.

Bw—4 to 16 inches; light yellowish brown (10YR 6/4) loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common medium tubular and common very fine dendritic tubular pores; 12 percent gravel; extremely acid (pH 4.0); abrupt smooth boundary.

Cr—16 inches; very pale brown (10YR 8/2), weakly weathered, tuffaceous, pyroclastic rock; extremely acid (pH 3.9).

Range in Characteristics

These soils are 10 to 20 inches deep. The content of gravel ranges from 0 to 15 percent. The content of cobbles is 0 to 1 percent.

The A horizon has dry color of 10YR 6/3 or 6/4 and moist color of 7.5YR 4/4 or 10YR 3/3 or 4/3. The texture is loam or sandy loam. Reaction ranges from very strongly acid to moderately acid.

The Bw horizon has dry color of 10YR 6/3 or 6/4 and moist color of 7.5YR 4/4 or 10YR 4/3. The texture is loam or sandy loam. Reaction ranges from extremely acid to moderately acid.

These soils are a taxadjunct to the Amador series because the base saturation (by NH_4OAc) is less than 60 percent in all horizons at a depth between 10 and 20 inches from the surface of the mineral soil. The A horizon is very strongly acid. The B horizon is extremely acid and has dry color of 10YR 6/4. These differences, however, do not significantly affect use and management.

Archerdale Series

The Archerdale series consists of very deep, well drained soils on stream terraces and strath terraces. These soils formed in alluvium derived from metamorphic and volcanic rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Fine, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon

Archerdale clay loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 53 minutes, 7 seconds N. and long. 120 degrees, 53 minutes, 9 seconds W.; USGS Farmington topographic quadrangle, NAD 27.

Ap—0 to 10 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine and few fine roots; few very fine dendritic tubular pores; few fine distinct yellowish brown (10YR 5/4, moist) masses of oxidized iron; slightly alkaline (pH 7.6); clear smooth boundary.

A—10 to 19 inches; brown (10YR 5/3) clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine, fine, medium, and coarse roots; few very fine dendritic tubular pores; neutral (pH 7.0); gradual smooth boundary.

AB—19 to 30 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few pressure faces; slightly alkaline (pH 7.6); clear smooth boundary.

Bw1—30 to 50 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; many pressure faces; slightly alkaline (pH 7.6); clear smooth boundary.

Bw2—50 to 60 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few pressure faces; slightly alkaline (pH 7.6).

Range in Characteristics

These soils are more than 60 inches deep. The content of clay in the 10- to 40-inch particle-size control section ranges from 35 to 45 percent.

The A horizon has dry color of 7.5YR 5/2 or 10YR 4/2, 4/3, 5/1, 5/2, or 5/3 and moist color of 7.5YR 3/2 or 10YR 3/1, 3/2, or 3/3. In areas adjacent to streams or sloughs, the soils have a 10 to 20 inch thick overwash of stratified very fine sandy loam. The overwash has dry color of 10YR 6/2 or 6/3, moist color of 10YR 4/2 or 4/3, reaction of slightly acid or neutral, and gravel content of 0 to 5 percent.

The Bw horizon has dry color of 7.5YR 5/4 or 6/4 or 10YR 5/2, 5/3, 5/4, 6/2, 6/3, or 6/4 and moist color of 7.5YR 3/4 or 4/4 or 10YR 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4. The texture is clay loam, silty clay loam, or clay.

The soils mapped as Archerdale in map units 107—Archerdale clay loam, 0 to 2 percent slopes, and 301—Archerdale-Hicksville association, 0 to 2 percent slopes, have elevations that are outside of the range for the series. Also, in some pedons, the soils in map unit 301 are gravelly. These differences, however, do not significantly affect use and management.

Auburn Series

The Auburn series consists of shallow, well drained soils on hillslopes. These soils formed in material weathered from residuum and colluvium derived from greenschist. Slopes range from 5 to 50 percent.

Taxonomic class: Loamy, mixed, superactive, thermic Lithic Haploxerepts

Typical Pedon

Auburn silt loam, 5 to 15 percent slopes; Stanislaus County, California; about 900 feet west and 2,330 feet south of the northeast corner of sec. 17, T. 1 N., R. 11 E., Mount Diablo Base and Meridian; lat. 37 degrees, 56 minutes, 18 seconds N. and long. 120 degrees, 46 minutes, 57 seconds W.; USGS Bachelor Valley topographic quadrangle, NAD 27.

A—0 to 4 inches; dark yellowish brown (10YR 4/4) silt loam, dark brown (10YR 3/3) moist; moderate fine granular structure; moderately hard, very friable, nonsticky

and nonplastic; few fine and many very fine roots; many fine interstitial and many medium tubular pores; 14 percent gravel; moderately acid (pH 5.6); clear wavy boundary.

Bw1—4 to 10 inches; strong brown (7.5YR 4/6) silt loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, nonsticky and nonplastic; common very fine roots; many very fine dendritic tubular pores; 10 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bw2—10 to 13 inches; reddish brown (5YR 4/4) gravelly silt loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine roots; many very fine dendritic tubular pores; 18 percent gravel; moderately acid (pH 6.0); abrupt irregular boundary.

R—13 inches; grayish green (5G 5/2) greenschist.

Range in Characteristics

These soils are 10 to 20 inches deep. The content of rock fragments ranges from 0 to 25 percent. The fragments are pebbles, cobbles, and stones.

The A horizon has dry color of 7.5YR 4/4 or 5/4 or 10YR 4/4 or 5/4 and moist color of 7.5YR 3/2 or 3/3 or 10YR 3/2 or 3/3. The texture is loam or silt loam. Reaction is moderately acid or slightly acid.

The Bw horizon has dry color of 5YR 4/4 or 7.5YR 4/4, 4/6, or 5/6 and moist color of 5YR 3/3 or 7.5YR 3/2 or 3/3. The texture is loam, silt loam, gravelly fine sandy loam, or gravelly silt loam. Reaction ranges from strongly acid to slightly acid.

The depth to the R layer varies from more than 20 inches to less than 20 inches within short distances. This difference, however, does not significantly affect use and management.

Bellota Series

The Bellota series consists of moderately well drained soils that are moderately deep over a duripan and are on deeply dissected fan remnants. These soils formed in alluvium from dominantly granitic rock sources. Slopes range from 2 to 15 percent.

Taxonomic class: Fine-loamy, mixed, superactive, thermic Abruptic Durixeralfs

Typical Pedon

Bellota sandy loam in an area of Keyes-Bellota complex, 2 to 15 percent slopes; Stanislaus County, California; 1,200 feet west of the northeast corner of sec. 30, T. 3 N., R. 9 E., Mount Diablo Base and Meridian; lat. 38 degrees, 5 minutes, 12 seconds N. and long. 121 degrees, 1 minute, 17 seconds W.; USGS Linden topographic quadrangle.

A1—0 to 3 inches; light brownish gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak very coarse subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine roots; many very fine dendritic tubular pores; 10 percent gravel; slightly acid (pH 6.3); clear smooth boundary.

A2—3 to 9 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine and many very fine dendritic tubular pores; 10 percent gravel; slightly acid (pH 6.3); gradual smooth boundary.

Bt1—9 to 17 inches; brown (7.5YR 5/2) gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; hard, friable, moderately sticky and slightly plastic; few very fine roots; common fine and many very fine

dendritic tubular pores and few medium tubular pores; 15 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

Bt2—17 to 23 inches; brown (7.5YR 4/2 and 5/2) cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine roots; many very fine and few fine dendritic tubular pores; 10 percent gravel; 15 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

2Btss1—23 to 31 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate very coarse subangular blocky structure; extremely hard, very firm, moderately sticky and moderately plastic; few very fine dendritic tubular pores; many moderately thick clay films between sand grains; 5 percent gravel; common discontinuous distinct slickensides on vertical faces of peds; 5 percent gravel; neutral (pH 7.0); clear wavy boundary.

2Btss2—31 to 35 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; moderate coarse angular blocky structure; extremely hard, very firm, moderately sticky and moderately plastic; few very fine dendritic tubular pores; common discontinuous distinct slickensides on vertical faces of peds; 2 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

2Bqm—35 to 37 inches; light gray (2.5Y 7/2) strongly cemented duripan, light brownish gray (2.5Y 6/2) moist; rigid; few black (10YR 2/1) manganese coatings; abrupt wavy boundary.

2Cr—37 to 60 inches; pale brown (10YR 6/3), andesitic, tuffaceous sandstone, brown (10YR 4/3) moist; neutral (pH 7.0).

Range in Characteristics

Depth to a duripan ranges from 20 to 40 inches.

The A horizon has dry color of 10YR 4/2, 5/2, 5/3, 6/2, or 6/4 and moist color of 7.5YR 3/2 or 10YR 3/2, 3/3, or 3/4. The texture is sandy loam or loam. The content of gravel ranges from 0 to 15 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has dry color of 7.5YR 4/2, 5/2, or 5/4 or 10YR 5/2, 5/3, or 6/4 and moist color of 7.5YR 3/2, 3/4, or 10YR 3/3. The texture is cobbly sandy clay loam, gravelly sandy clay loam, or gravelly clay loam. The content of clay ranges from 20 to 30 percent. The content of gravel ranges from 15 to 25 percent. The content of cobbles ranges from 5 to 15 percent. Reaction is moderately acid or slightly acid.

The 2Btss horizon has dry color of 7.5YR 4/2 or 5/2 or 10YR 4/2 or 5/3 and moist color of 7.5YR 3/2 or 4/2 or 10YR 3/2, 3/3, 4/2, or 4/3. The content of clay ranges from 40 to 60 percent. The content of gravel ranges from 0 to 5 percent. Reaction is slightly acid or neutral.

The 2Bqm horizon has dry color of 10YR 5/3, 6/3, 7/4, 7/6, or 8/1 or 2.5Y 7/2 and moist color of 10YR 4/3, 4/4, 5/4, 6/3, or 7/2 or 2.5Y 6/2 or 7/2. Cementation ranges from weak to indurated.

The 2Cr horizon has the same range in colors as the 2Bqm horizon.

Capay Taxadjunct

The Capay taxadjunct consists of very deep, moderately well drained soils on flood plains. These soils formed in clayey alluvium derived from metamorphic and volcanic rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Fine, smectitic, thermic Typic Calcixererts

Typical Pedon

Capay clay, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37

degrees, 52 minutes, 23 seconds N. and long. 120 degrees, 53 minutes, 3 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

A1—0 to 15 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate coarse columnar structure; very hard, very firm, moderately sticky and moderately plastic; many very fine roots; common very fine dendritic tubular pores; neutral (pH 7.0); clear smooth boundary.

A2—15 to 20 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, moderately sticky and moderately plastic; few very fine roots; common very fine dendritic tubular pores; neutral (pH 7.0); clear smooth boundary.

Bssk—20 to 40 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; weak coarse wedge structure; very hard, very firm, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few intersecting slickensides; strongly effervescent; segregated carbonates in seams and soft masses; slightly alkaline (pH 7.6); clear smooth boundary.

Bk—40 to 60 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, moderately sticky and moderately plastic; few very fine dendritic tubular pores; slightly effervescent; segregated carbonates in seams and disseminated carbonates; slightly alkaline (pH 7.6).

Range in Characteristics

These soils are more than 60 inches deep. Reaction is neutral or slightly alkaline.

The A horizon has dry color of 7.5YR 5/2 or 10YR 3/2, 4/2, 5/2, or 5/3 and moist color of 7.5YR 4/2 or 10YR 2/2, 3/2, 4/2, or 4/3. The texture is clay loam or clay.

The Bssk and Bk horizons have dry color of 7.5YR 5/2 or 10YR 4/2, 4/3, 5/2, 5/3, 5/4, 6/3, or 6/4 and moist color of 7.5YR 4/2 or 10YR 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4. The texture is clay loam, silty clay loam, silty clay, or clay.

These soils are a taxadjunct to the series because of an assumed calcic horizon within 1 meter of the surface based on field determinations of calcium carbonate equivalent. Laboratory data for calcium carbonate equivalent are needed to determine if there is actually a calcic horizon.

Chuloak Series

The Chuloak series consists of very deep, moderately well drained soils on alluvial fans. These soils formed in alluvium derived from granitic rock. Slopes range from 0 to 2 percent.

Taxonomic class: Fine-loamy, mixed, superactive, thermic Typic Argixerolls

Typical Pedon

Chuloak sandy loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 49 minutes, 29 seconds N. and long. 120 degrees, 54 minutes, 10 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

Ap—0 to 12 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine dendritic tubular pores; moderately acid (pH 5.8); clear smooth boundary.

Bt1—12 to 18 inches; dark grayish brown (10YR 4/2) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine dendritic tubular pores; few thin clay films on faces of peds; slightly acid (pH 6.3); clear wavy boundary.

Bt2—18 to 24 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few thin clay films on faces of peds; slightly acid (pH 6.3); clear wavy boundary.

Bt3—24 to 38 inches; brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; neutral (pH 7.0); clear wavy boundary.

C—38 to 60 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; neutral (pH 7.0).

Range in Characteristics

The Ap horizon has dry color of 10YR 4/2 or 5/2 and moist color of 10YR 3/1 or 3/2. Reaction is moderately acid or slightly acid.

The Bt horizon has dry color of 7.5YR 4/2 or 10YR 4/2, 5/2, or 5/3 and moist color of 7.5YR 3/3 or 10YR 4/2, 4/3, or 3/3. The texture is loam or sandy clay loam. Reaction is slightly acid or neutral.

The C horizon has dry color of 10YR 5/3 or 6/3 and moist color of 10YR 4/3 or 5/3. The texture is loamy coarse sand, sandy loam, or fine sandy loam.

Clear Lake Series

The Clear Lake series consists of very deep, poorly drained soils in swales of drainageways. These soils formed in clayey alluvium derived from metamorphic and volcanic rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Fine, smectitic, thermic Xeric Endoaquerts

Typical Pedon

Clear Lake clay, partially drained, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 48 minutes, 27 seconds N. and long. 120 degrees, 49 minutes, 15 seconds W.; USGS Oakdale topographic quadrangle, NAD 27.

A—0 to 10 inches; gray (10YR 5/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine dendritic tubular pores; moderately alkaline (pH 8.2); clear smooth boundary.

Bss1—10 to 30 inches; gray (10YR 5/1) clay, very dark gray (10YR 3/1) moist; weak coarse wedge structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine dendritic tubular pores; few fine prominent black (10YR 2/1, moist) manganese concretions; few intersecting slickensides; moderately alkaline (pH 8.2); gradual smooth boundary.

Bss2—30 to 60 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; weak coarse wedge structure; very hard, very firm, very sticky and very plastic; few fine distinct brown (7.5YR 4/4, moist) masses of oxidized iron; few intersecting slickensides; moderately alkaline (pH 8.2).

Range in Characteristics

The A horizon has dry color of 10YR 3/1, 4/1, or 5/1 and moist color of 10YR 2/1 or 3/1.

The Bss horizon has dry color of 10YR 3/1, 4/1, 5/1, or 5/2 and moist color of 10YR 3/1, 3/2, 4/1, or 4/2. The texture is silty clay or clay.

In some pedons, the lower part of the Bss horizon has segregations of carbonates in soft masses and seams. This difference, however, does not significantly affect use and management.

Cogna Series

The Cogna Series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium derived from metamorphic and volcanic rock. Slopes range from 0 to 2 percent.

Taxonomic class: Fine-silty, mixed, superactive, thermic Calcic Pachic Haploxerolls

Typical Pedon

Cogna loam, 0 to 2 percent slopes; Stanislaus County, California; about 800 feet south and 1,850 feet west of the northeast corner of sec. 16, T. 2 N., R. 8 E., Mount Diablo Base and Meridian; lat. 38 degrees, 2 minutes, 30 seconds N. and long. 121 degrees, 6 minutes, 22 seconds W.; USGS Linden topographic quadrangle, NAD 27.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, 40 percent dark brown (10YR 3/3) and 60 percent very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine, few medium, and common very fine roots throughout; few very fine dendritic tubular pores; slightly acid (pH 6.3); clear smooth boundary.

A—6 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, common medium, common coarse, and common very fine roots throughout; common very fine dendritic tubular pores; neutral (pH 7.0); clear smooth boundary.

AB—13 to 25 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and common very fine roots throughout; few fine dendritic tubular and few very fine dendritic tubular pores; neutral (pH 7.0); gradual smooth boundary.

Bk—25 to 38 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, few medium, and common very fine roots throughout; few very fine dendritic tubular pores; few fine prominent irregular very pale brown (10YR 8/2) carbonate masses in cracks; slightly effervescent; slightly alkaline (pH 7.6); gradual smooth boundary.

C1—38 to 49 inches; pale brown (10YR 6/3) loam, brown (7.5YR 4/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and common very fine roots throughout; few medium tubular and few very fine dendritic tubular pores; slightly effervescent; slightly alkaline (pH 7.6); gradual smooth boundary.

C2—49 to 64 inches; brown (10YR 5/3) loam, brown (7.5YR 4/4) broken face and moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots throughout; common very fine dendritic tubular pores; slightly effervescent; moderately alkaline (pH 8.2)

Range in Characteristics

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 3/2 or 3/3. Reaction ranges from slightly acid to slightly alkaline.

The Bk horizon has dry color of 10YR 4/2, 4/3, 5/3, or 5/4 and moist color of 10YR 3/3, 3/4, 4/3, or 4/4. The texture is loam, silt loam, or clay loam.

The C horizon has dry color of 10YR 4/2, 4/3, 5/3, 5/4, or 6/3 and moist color of

10YR 3/3, 3/4, 4/3, or 4/4. The texture is loam, silt loam, or clay loam. Reaction is slightly alkaline or moderately alkaline.

Columbia Series

The Columbia series consists of very deep, somewhat poorly drained soils on flood plains. These soils are artificially drained. They formed in coarse-loamy alluvium derived from mixed rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Xerofluvents

Typical Pedon

Columbia sandy loam, drained, 0 to 2 percent slopes, rarely flooded; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 46 minutes, 51 seconds N. and long. 120 degrees, 50 minutes, 22 seconds W.; USGS Oakdale topographic quadrangle, NAD 27.

Ap—0 to 13 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; few fine distinct yellowish brown (10YR 5/6, moist) masses of oxidized iron; slightly acid (pH 6.3); clear smooth boundary.

C1—13 to 27 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; few very fine dendritic tubular pores; few fine distinct strong brown (7.5YR 4/6, moist) masses of oxidized iron; slightly acid (pH 6.3); clear smooth boundary.

C2—27 to 39 inches; brown (10YR 5/3) sand, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; few very fine dendritic tubular pores; slightly acid (pH 6.3); clear smooth boundary.

C3—39 to 60 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; many medium distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine dendritic tubular pores; slightly acid (pH 6.3).

Range in Characteristics

The content of gravel ranges from 0 to 5 percent.

The Ap horizon has dry color of 10YR 5/2, 5/3, 6/2, or 6/3 and moist color of 10YR 4/2 or 4/3. Reaction ranges from slightly acid to slightly alkaline.

The C horizon has dry color of 10YR 5/3, 5/4, 6/1, 6/2, or 6/3 and moist color of 10YR 4/1, 4/2, 4/3, 5/2, or 5/3. Redoximorphic features are distinct or prominent. The texture is stratified, ranging from sand to silt loam. Reaction ranges from slightly acid to slightly alkaline.

The Ab horizon, where present, is below a depth of 40 inches. It has dry color of 10YR 2/1, 3/1, 4/1, 4/2, 5/1, or 6/1 or 2.5Y 6/2 and moist color of 10YR 2/1, 3/1, 4/1, or 5/1 or 2.5Y 3/2. The texture is clay loam, silty clay loam, or clay. Reaction ranges from neutral to moderately alkaline.

Cometa Series

The Cometa series consists of moderately deep, moderately well drained soils on fan remnants. These soils formed in fine-loamy alluvium derived from granite. Slopes range from 2 to 8 percent.

Taxonomic class: Fine, mixed, superactive, thermic Typic Palexeralfs

Typical Pedon

Cometa sandy loam, 2 to 8 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 50 minutes, 21 seconds N. and long. 120 degrees, 54 minutes, 0 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

A—0 to 15 inches; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine dendritic tubular pores; slightly acid (pH 6.3); abrupt wavy boundary.

Bt1—15 to 28 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; common very fine and fine dendritic tubular pores; few thin clay films lining pores; slightly acid (pH 6.3); abrupt wavy boundary.

Bt2—28 to 40 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; moderate coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; few very fine roots; common very fine dendritic tubular pores; common moderately thick clay films on faces of peds; slightly acid (pH 6.3); abrupt wavy boundary.

Btq—40 to 60 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weakly cemented; massive; hard, very firm, nonsticky and nonplastic; few thin clay films bridging sand grains; neutral (pH 7.0).

Range in Characteristics

Depth to a weakly cemented Btq horizon ranges from 40 to 60 inches.

The A horizon has dry color of 7.5YR 5/2 or 10YR 5/2 or 5/3 and moist color of 7.5YR 4/2 or 4/4 or 10YR 3/3 or 4/3. Reaction is moderately acid or slightly acid.

The Bt horizon has dry color of 5YR 4/4 or 5/4 or 7.5YR 4/2, 4/4, 4/6, 5/2, or 5/4 and moist color of 5YR 3/4 or 4/4 or 7.5YR 4/2, 4/4, or 4/6. The texture is clay loam, sandy clay, or clay. The content of clay ranges from 35 to 50 percent. Reaction is slightly acid or neutral.

The Btq horizon has dry color of 7.5YR 4/4 or 5/4 and moist color of 7.5YR 4/4 or 5/4.

Delhi Series

The Delhi series consists of very deep, somewhat excessively drained soils on sand sheets and dunes on flood plains. These soils formed in wind-modified alluvium derived from granite. Slopes range from 0 to 5 percent.

Taxonomic class: Mixed, thermic Typic Xeropsamments

Typical Pedon

Delhi loamy sand, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 47 minutes, 2 seconds N. and long. 120 degrees, 53 minutes, 43 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

Ap—0 to 10 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; single grained; loose, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; neutral (pH 7.0); clear smooth boundary.

A—10 to 20 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; massive; loose, very friable, nonsticky and nonplastic; few very

fine roots; common very fine interstitial pores; slightly alkaline (pH 7.6); clear smooth boundary.

C1—20 to 31 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; massive; loose, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; slightly alkaline (pH 7.6); clear smooth boundary.

C2—31 to 50 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; massive; loose, very friable, nonsticky and nonplastic; common very fine interstitial pores; slightly alkaline (pH 7.6); clear wavy boundary.

C3—50 to 60 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; massive; loose, very friable, nonsticky and nonplastic; few very fine interstitial pores; slightly alkaline (pH 7.6).

Range in Characteristics

The content of clay ranges from 0 to 5 percent. Reaction ranges from slightly acid to slightly alkaline.

The A horizon has dry color of 10YR 5/2, 5/3, 5/4, or 6/2 and moist color of 10YR 4/2 or 4/3. The texture is fine sand or loamy sand.

The C horizon has dry color of 10YR 5/2, 6/2, or 6/3 and moist color of 10YR 4/2, 4/3, 5/2, or 5/3. The texture is fine sand, loamy sand, or sand.

Exeter Series

The Exeter series consists of moderately well drained soils that are moderately deep over a duripan and are on fan remnants. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Fine-loamy, mixed, superactive, thermic Typic Durixeralfs

Typical Pedon

Exeter sandy loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 47 minutes, 47 seconds N. and long. 120 degrees, 53 minutes, 29 seconds W.; USGS Escalon topographic quadrangle, NAD27.

Ap—0 to 4 inches; brown (7.5YR 5/2) sandy clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine roots; common very fine dendritic tubular pores; neutral (pH 7.0); clear wavy boundary.

A—4 to 12 inches; brown (7.5YR 5/2) sandy clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine roots; many very fine dendritic tubular pores; neutral (pH 7.0); clear wavy boundary.

Bt1—12 to 24 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/2) moist; massive; very hard, friable, moderately sticky and moderately plastic; common very fine roots; few very fine dendritic tubular pores; common fine distinct dark brown (7.5YR 4/4, moist) masses of oxidized iron; few fine prominent black (10YR 2/1, moist) manganese coatings on faces of peds; few thin clay films lining pores; neutral (pH 7.0); gradual wavy boundary.

Bt2—24 to 36 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/3) moist; massive; very hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; common fine distinct dark brown (7.5YR 4/4, moist) masses of oxidized iron; few fine prominent black (10YR 2/1, moist) manganese coatings on faces of peds; few thin clay films lining pores; neutral (pH 7.0); abrupt wavy boundary.

Bqm—36 to 60 inches; brown (7.5YR 5/4) very strongly cemented duripan, dark brown (7.5YR 4/4) moist; rigid.

Range in Characteristics

Depth to a duripan ranges from 20 to 40 inches.

The A horizon has dry color of 7.5YR 5/2 or 10YR 5/2 or 5/3 and moist color of 7.5YR 3/2 or 10YR 3/2, 3/3, 4/2, or 4/3. Reaction is slightly acid or neutral.

The Bt horizon has dry color of 7.5YR 5/2 or 5/4 and moist color of 7.5YR 4/2, 4/3, or 4/4. The texture is loam, sandy clay loam, or clay loam. Reaction is neutral or slightly alkaline.

The Bqm horizon has dry color of 7.5YR 5/2 or 5/4 and moist color of 7.5YR 4/2 or 4/4.

The moist colors of the A horizon are outside of the range specified in the official soil series description. This difference, however, does not significantly affect use and management.

Finrod Series

The Finrod series consists of moderately well drained soils that are deep over a duripan and are on alluvial fans. These soils formed in clayey alluvium derived from metamorphic and volcanic rock. Slopes range from 0 to 2 percent.

Taxonomic class: Fine, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon

Finrod clay, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 52 minutes, 58 seconds N. and longitude 120 degrees, 53 minutes, 6 seconds W.; USGS Farmington topographic quadrangle, NAD 27.

Ap—0 to 10 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine and few fine roots; few very fine dendritic tubular pores; neutral (pH 7.0); gradual smooth boundary.

A—10 to 25 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine and few fine roots; few very fine dendritic tubular pores; few pressure faces; neutral (pH 7.0); gradual smooth boundary.

Bw1—25 to 30 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few pressure faces; moderately alkaline (pH 8.1); clear smooth boundary.

Bw2—30 to 40 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; moderately alkaline (pH 8.1); abrupt wavy boundary.

2Bqm—40 to 60 inches; brown (7.5YR 5/2) strongly cemented duripan, dark brown (7.5YR 4/2) moist; extremely hard.

Range in Characteristics

Depth to a duripan ranges from 40 to 60 inches. The content of clay in the 10- to 40-inch control section ranges from 35 to 45 percent.

The A horizon has dry color of 7.5YR 5/2 or 10YR 5/2 and moist color of 7.5YR 3/2 or 10YR 3/2.

The Bw horizon has dry color of 7.5YR 5/4 or 6/4 and moist color of 7.5YR 3/4 or

4/4. The texture is clay loam, silty clay loam, or clay. Reaction ranges from neutral to moderately alkaline.

The 2Bqm has dry color of 7.5YR 5/2 or 5/4 and moist color of 7.5YR 4/2 or 4/4.

Hicksville Series

The Hicksville series consists of very deep, moderately well drained soils on stream terraces. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs

Typical Pedon

Hicksville loam, 0 to 2 percent slopes, occasionally flooded; Stanislaus County, California; in an unsectionalized area of T. 1 N., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 53 minutes, 15 seconds N. and long. 120 degrees, 53 minutes, 9 seconds W.; USGS Farmington topographic quadrangle, NAD 27.

A—0 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine dendritic tubular pores; slightly acid (pH 6.3); clear smooth boundary.

Bt1—10 to 25 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; common very fine dendritic tubular pores; common thin clay films lining pores and on ped faces; slightly acid (pH 6.3); clear smooth boundary.

Bt2—25 to 45 inches; yellowish brown (10YR 5/4) sandy clay loam, dark brown (10YR 3/3) moist; massive; very hard, friable, moderately sticky and moderately plastic; few very fine dendritic tubular pores; few thin clay films lining pores; neutral (pH 7.0); clear smooth boundary.

2Bt—45 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; hard, friable, nonsticky and nonplastic; few thin clay films bridging mineral grains; 10 percent gravel; neutral (pH 7.0).

Range in Characteristics

The A horizon has dry color of 10YR 5/2 or 5/3 and moist color of 7.5YR 3/2 or 10YR 3/2 or 3/3. The texture is gravelly loam or loam. The content of gravel ranges from 0 to 35 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has dry color of 10YR 4/3, 5/2, or 5/4 and moist color of 10YR 3/2 or 3/3. The texture is gravelly sandy clay loam, sandy clay loam, gravelly clay loam, or clay loam. The content of gravel ranges from 5 to 35 percent. Reaction ranges from slightly acid to slightly alkaline.

The 2Bt horizon has dry color of 10YR 6/3 or 6/4 and moist color of 10YR 5/2 or 5/3. The texture is stratified gravelly loamy sand, very gravelly loamy sand, very gravelly sandy loam, sandy loam, very gravelly sandy clay loam, sandy clay loam, or gravelly clay loam. The content of gravel ranges from 5 to 50 percent. The content of cobbles ranges from 0 to 5 percent. Reaction is neutral or slightly alkaline.

Hollenbeck Series

The Hollenbeck series consists of moderately well drained soils that are deep over a duripan and are in backswamps on flood plains. These soils formed in clayey alluvium derived from metamorphic and volcanic rock sources. Slopes range from 0 to 3 percent.

Taxonomic class: Fine, smectitic, thermic Chromic Haploxererts

Typical Pedon

Hollenbeck silty clay, 1 to 3 percent slopes; San Joaquin County, California; 1,280 feet north and 40 feet east of the southwest corner of sec. 16, T. 1 N., R. 8 E., Mount Diablo Base and Meridian; lat. 37 degrees, 56 minutes, 25 seconds N. and long. 121 degrees, 6 minutes, 35 seconds W.; USGS Peters topographic quadrangle.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine dendritic tubular pores; neutral (pH 7.0); abrupt smooth boundary.

Bss1—10 to 27 inches; brown (10YR 4/3) clay, very dark grayish brown (10YR 3/2) moist; moderate coarse angular blocky and moderate medium wedge structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine dendritic tubular pores; many continuous distinct slickensides; neutral (pH 7.0); gradual wavy boundary.

Bss2—27 to 37 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate coarse angular blocky and moderate medium wedge structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; few very fine dendritic tubular pores; many continuous distinct slickensides; few fine prominent black (10YR 2/1, moist) iron-manganese concretions; slightly alkaline (pH 7.6); clear wavy boundary.

Bk—37 to 42 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse angular blocky structure; very hard, firm, moderately sticky and moderately plastic; few very fine dendritic tubular pores; common fine white (10YR 8/2) carbonate masses; strongly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

Bkqm—42 to 60 inches; light yellowish brown (10YR 6/4) strongly cemented duripan, brown (10YR 4/3) moist; extremely hard; few fine white (10YR 8/2) carbonate masses; slightly effervescent.

Range in Characteristics

Depth to a duripan ranges from 40 to 60 inches. The combined thickness of the A, Bss, and Bk horizons ranges from 40 to 60 inches.

The Ap and Bss horizons have dry color of 7.5YR 4/2 or 5/2 or 10YR 3/2, 4/2, 4/3, or 5/2 and moist color of 7.5YR 3/2 or 10YR 3/2 or 3/3. The texture is silty clay, clay, or silty clay loam. Reaction ranges from neutral to moderately alkaline.

The Bk horizon has dry color of 7.5YR 4/4 or 10YR 4/2, 4/3, 4/4, 5/2, or 5/3 and moist color of 7.5YR 3/4 or 10YR 3/2, 3/3, 4/2, or 4/3. The texture is silty clay loam or clay loam. The horizon has concretions or soft masses of carbonates. Reaction ranges from neutral to moderately alkaline.

The Bkqm horizon has dry color of 10YR 4/3, 4/4, 5/3, 5/4, or 6/4 and moist color of 10YR 4/2, 4/3, or 5/2.

Honcut Series

The Honcut series consists of very deep, well drained soils on flood plains. These soils formed in coarse-loamy alluvium derived from granite. Slopes range from 0 to 5 percent.

Taxonomic class: Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon

Honcut sandy loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 47 minutes, 41 seconds N. and long. 120 degrees, 54 minutes, 58 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

Ap—0 to 6 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, nonsticky and nonplastic; few very fine, fine, and coarse roots; few fine interstitial pores; neutral (pH 7.0); clear smooth boundary.

A—6 to 14 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 4/2) moist; massive; hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few fine interstitial pores; 10 percent gravel; slightly acid (pH 6.3); gradual smooth boundary.

C1—14 to 24 inches; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 4/2) moist; massive; hard, friable, nonsticky and nonplastic; few very fine, fine, and coarse roots; few fine interstitial pores; 5 percent gravel; slightly acid (pH 6.3); gradual smooth boundary.

C2—24 to 60 inches; brown (10YR 5/3) coarse sandy loam, dark brown (7.5YR 4/3) moist; massive; hard, firm, nonsticky and nonplastic; few very fine roots; few fine interstitial pores; slightly acid (pH 6.3).

Range in Characteristics

The content of gravel ranges from 0 to 25 percent.

The A horizon has dry color of 7.5YR 5/2 or 10YR 5/2, 5/3, or 5/4 and moist color of 7.5YR 4/2 or 10YR 3/3, 4/2, or 4/3. The texture is sandy loam, fine sandy loam, or gravelly sandy loam. Reaction is slightly acid or neutral.

The C horizon has dry color of 7.5YR 5/2 or 10YR 5/2, 5/3, 5/4, 6/3, or 6/4 and moist color of 7.5YR 4/2 or 4/3 or 10YR 4/2, 4/3, or 4/4. The texture is sandy loam, coarse sandy loam, gravelly sandy loam, or gravelly coarse sandy loam. Reaction ranges from slightly acid to slightly alkaline.

Jahant Series

The Jahant series consists of moderately well drained soils that are deep over a duripan and are on fan remnants. These soils formed in alluvium derived from granite. Slopes range from 2 to 8 percent.

Taxonomic class: Fine-loamy, mixed, superactive, thermic Mollic Palexeralfs

Typical Pedon

Jahant loam, 2 to 8 percent slopes; San Joaquin County, California; 50 feet south and 2,550 feet east of the northwest corner of sec. 22, T. 4 N., R. 6 E., Mount Diablo Base and Meridian; lat. 38 degrees, 11 minutes, 21 seconds N. and long. 121 degrees, 18 minutes, 27 seconds W.; USGS Lodi North topographic quadrangle.

Ap1—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine dendritic tubular pores; 11 percent gravel; slightly acid (pH 6.3); gradual wavy boundary.

Ap2—5 to 14 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine dendritic tubular pores; slightly acid (pH 6.3); clear wavy boundary.

Bt1—14 to 22 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; very hard, friable, slightly sticky and slightly plastic; slightly acid (pH 6.3); gradual wavy boundary.

Bt2—22 to 31 inches; brown (7.5YR 4/4) loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine dendritic tubular pores; slightly acid (pH 6.3); abrupt wavy boundary.

Bt3—31 to 36 inches; brown (7.5YR 5/4 and 4/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; extremely hard, firm, moderately sticky and moderately plastic; few very fine roots; common very fine dendritic tubular pores; neutral (pH 7.0); abrupt wavy boundary.

Bt4—36 to 49 inches; brown (7.5YR 4/4 and 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; extremely hard, firm, moderately sticky and moderately plastic; few fine and many very fine dendritic tubular pores; slightly acid (pH 6.3); abrupt wavy boundary.

Bqm1—49 to 53 inches; brown (7.5YR 4/4 and 5/4) strongly cemented duripan, dark brown (7.5YR 4/4) moist; extremely hard; 11 percent gravel; abrupt wavy boundary.

Bqm2—53 to 60 inches; 40 percent brown (7.5YR 5/4) and 60 percent light brown (7.5YR 6/4) indurated duripan, 40 percent brown (7.5YR 4/4) and 60 percent dark brown (7.5YR 3/4) moist; very rigid; 7 percent gravel.

Range in Characteristics

Depth to a duripan ranges from 40 to 60 inches. The content of gravel ranges from 0 to 10 percent.

The A horizon has dry color of 7.5YR 5/2 or 10YR 5/2, 5/3, or 6/3 and moist color of 7.5YR 3/2 or 10YR 3/2 or 3/3. Reaction is slightly acid or neutral.

The upper part of the Bt horizon has dry color of 7.5YR 4/4, 5/4, or 6/4 or 10YR 6/3 or 6/4 and moist color of 7.5YR 4/4 or 10YR 3/3, 4/3, or 4/4. The texture is loam or clay loam. The content of clay ranges from 20 to 30 percent.

The lower part of the Bt horizon has dry color of 7.5YR 4/4, 4/6, 5/4, 5/6, or 6/4 or 10YR 5/2, 5/4, 5/6, or 6/4 and moist color of 7.5YR 3/4, 4/2, 4/4, or 4/6 or 10YR 4/4 or 4/6. The texture is clay loam or clay. The content of clay ranges from 35 to 60 percent.

The Bqm horizon has the same range in colors as the lower part of the Bt horizon. Cementation ranges from strongly cemented to indurated.

Keyes Series

The Keyes series consists of moderately well drained soils that are shallow over a duripan and are on fan remnants. These soils formed in alluvium derived from mixed rock sources. Slopes range from 2 to 5 percent.

Taxonomic class: Clayey, mixed, active, thermic shallow Abruptic Durixeralfs

Typical Pedon

Keyes gravelly loam in an area of Keyes-Redding Complex, 2 to 8 percent slopes; San Joaquin County, California; 575 feet north and 925 feet west of the southeast corner of sec. 30, T. 3 N., R. 9 E., Mount Diablo Base and Meridian; lat. 38 degrees, 4 minutes, 38 seconds N. and long. 121 degrees, 1 minute, 17 seconds W.; USGS Linden topographic quadrangle.

A—0 to 5 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots;

common very fine dendritic tubular pores; 20 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary.

AB—5 to 12 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky and slightly plastic; common very fine dendritic tubular pores; 20 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary with a stone line of metamorphic, quartzitic and andesitic gravel along the lower part.

2Bt1—12 to 15 inches; brown (7.5YR 5/2) gravelly clay, very dark grayish brown (10YR 3/2) moist; strong very coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine dendritic tubular pores; common moderately thick clay films on all faces of peds; 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

2Bt2—15 to 19 inches; brown (7.5YR 4/2) gravelly clay, dark brown (7.5YR 3/2) moist; strong very coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; common very fine dendritic tubular pores; common moderately thick clay films on all faces of peds; neutral (pH 7.0); abrupt smooth boundary.

2Bqm—19 to 34 inches; yellowish brown (10YR 5/4) very strongly cemented duripan, brown (7.5YR 4/4) moist; rigid; few strong brown (7.5YR 4/6) iron and black (10YR 2/1) manganese coatings on andesitic gravel; 40 percent gravel; abrupt smooth boundary.

3Cr—34 to 60 inches; light gray (10YR 7/1) andesitic, tuffaceous sandstone, grayish brown (10YR 5/2) moist; moderately cemented; slightly alkaline (pH 7.6).

Range in Characteristics

Depth to a duripan ranges from 10 to 20 inches.

The A horizon has dry color of 7.5YR 5/2 or 5/4 or 10YR 5/2, 5/3, 5/4, or 6/3 and moist color of 7.5YR 3/2 or 3/4 or 10YR 3/2, 3/3, or 4/4. The content of gravel ranges from 15 to 25 percent. The content of cobbles ranges from 0 to 10 percent. Reaction ranges from moderately acid to neutral.

The 2Bt horizon has dry color of 7.5YR 4/2, 4/4, or 5/2 or 10YR 5/2 and moist color of 7.5YR 3/2, 3/4, or 4/4 or 10YR 3/3. Reaction is slightly acid or neutral.

The 2Bqm horizon has dry color of 5YR 5/6, 7.5YR 5/6, or 10YR 5/4 and moist color of 5YR 4/6, 7.5YR 4/4 or 4/6, or 10YR 4/4. Cementation ranges from moderately cemented to indurated.

The 3Cr horizon has the same range in colors as the 2Bqm horizon.

Madera Series

The Madera series consists of moderately well drained soils that are moderately deep over a duripan and are on fan remnants. These soils formed in alluvium derived from granite. Slopes range from 0 to 2 percent.

Taxonomic class: Fine, smectitic, thermic Abruptic Durixeralfs

Typical Pedon

Madera sandy loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 47 minutes, 53 seconds N. and long. 120 degrees, 54 minutes, 50 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

Ap—0 to 10 inches; yellowish brown (10YR 5/4) sandy loam, brown (7.5YR 4/2) moist; massive; very hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine dendritic tubular pores; common fine distinct strong

brown (7.5YR 5/6, moist) masses of redoximorphic iron accumulation; slightly acid (pH 6.3); clear wavy boundary.

Bt1—10 to 19 inches; brown (7.5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; hard, firm, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few thin clay films bridging sand grains; slightly acid (pH 6.3); abrupt wavy boundary.

2Bt2—19 to 24 inches; brown (7.5YR 4/4) clay, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, moderately sticky and moderately plastic; very few very fine roots; few very fine dendritic tubular pores; common thick clay films on faces of peds and lining pores; moderately alkaline (pH 8.2); abrupt wavy boundary.

2Bkqm—24 to 60 inches; pale brown (10YR 6/3) strongly cemented duripan, dark yellowish brown (10YR 4/4) moist; extremely hard; many fine prominent black (N 2/0) manganese coatings; common fine prominent pinkish white (7.5YR 8/2) carbonate coatings; strongly effervescent.

Range in Characteristics

Depth to a duripan ranges from 20 to 40 inches. Most pedons have distinct or prominent redoximorphic features that are due to cultural practices associated with production of rice.

The A horizon has dry color of 7.5YR 5/2 or 10YR 5/2, 5/4, 6/2, or 6/3 and moist color of 7.5YR 4/2 or 10YR 4/2, 4/3, or 4/4. The texture is sandy loam or loam. Reaction ranges from moderately acid to neutral.

The Bt horizon has dry color of 5YR 6/3; 7.5YR 5/2, 5/4, or 6/4; or 10YR 5/3, 5/4, or 6/3 and moist color of 5YR 3/4, 4/3, or 4/4; 7.5YR 4/2, 4/4, or 5/4; or 10YR 4/3 or 4/4. Reaction is slightly acid or neutral.

The 2Bt horizon has dry color of 5YR 6/3; 7.5YR 4/4, 5/2, 5/4, or 6/4; or 10YR 5/3, 5/4, or 6/3 and moist color of 5YR 3/4, 4/3, or 4/4; 7.5YR 4/2, 4/4, or 5/4; or 10YR 4/3 or 4/4. The texture is clay loam, sandy clay, or clay. Reaction ranges from neutral to moderately alkaline.

The 2Bkqm horizon has the same range in colors as the 2Bt horizon. Cementation ranges from strongly cemented to indurated.

Mckeonhills Series

The Mckeonhills series consists of moderately deep, well drained soils on hills. These soils formed in residuum and colluvium derived from calcareous mudstone. Slopes range from 5 to 15 percent.

Taxonomic class: Fine, smectitic, thermic Aridic Haploxererts

Typical Pedon

Mckeonhills clay, 5 to 15 percent slopes (fig. 5); Stanislaus County, California; 100 feet west and 1,120 feet south of the northeast corner of sec. 1, T. 1 N., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 58 minutes, 15 seconds N. and long. 120 degrees, 48 minutes, 55 seconds W.; USGS Bachelor Valley topographic quadrangle, NAD 27.

A—0 to 4 inches; dark gray (5YR 4/1) clay, very dark gray (7.5YR 3/1) moist; moderate medium subangular blocky structure; rigid, firm, very sticky and very plastic; few fine and many very fine roots; few medium tubular pores; strongly effervescent; disseminated carbonates; moderately alkaline (pH 8.0); clear wavy boundary.

Bk1—4 to 9 inches; dark gray (5YR 4/1) clay, dark brown (7.5YR 3/2) moist; moderate coarse angular blocky structure; rigid, firm, very sticky and very plastic;

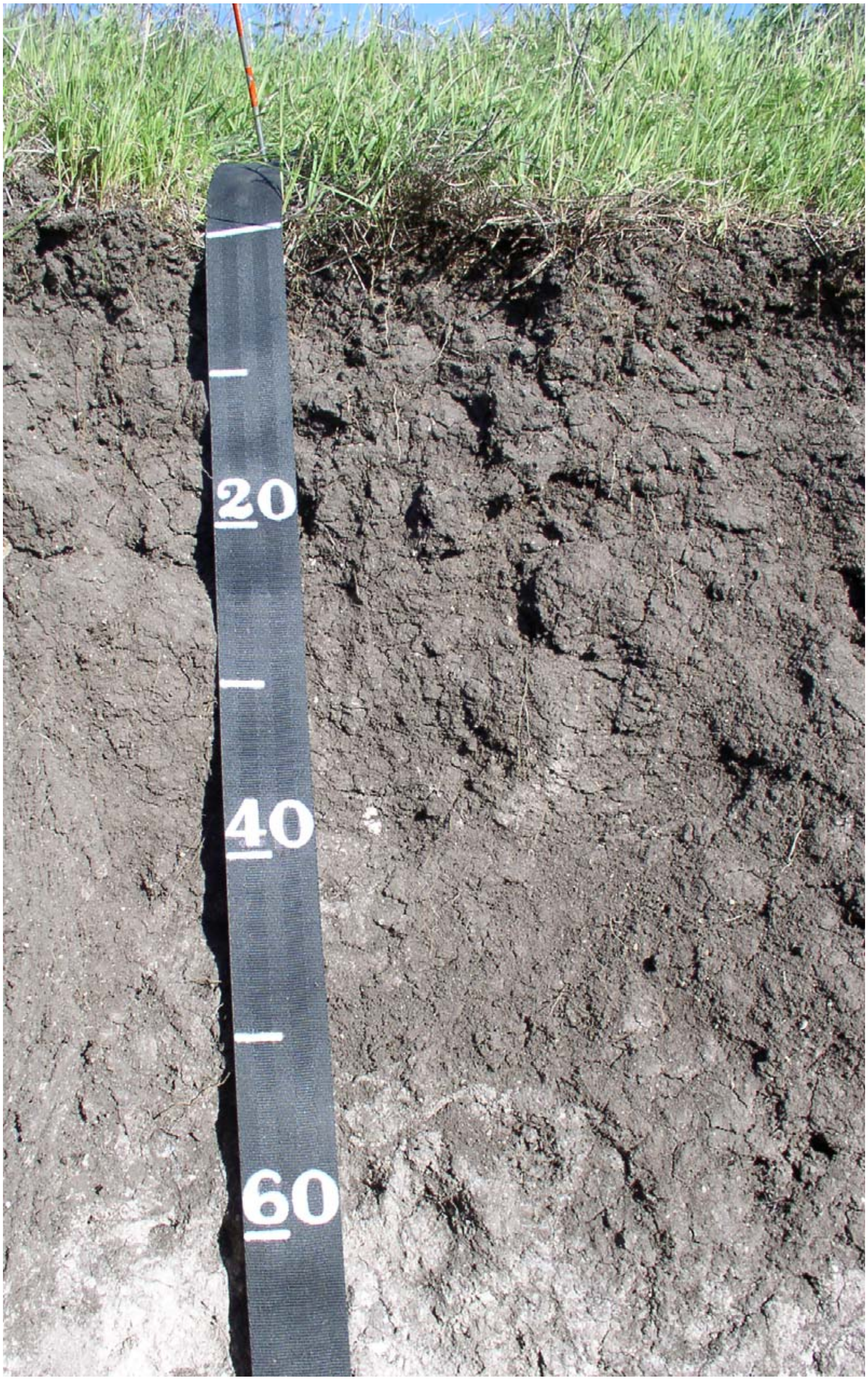

Figure 5.—A profile of a Mckeonhills soil. The Black Hill area of northern Stanislaus County is named for the dark gray color the Mckeonhills soil.

few fine and many very fine roots; few very fine dendritic tubular pores; strongly effervescent; disseminated carbonates and few nodules of segregated carbonates; moderately alkaline (pH 8.0); clear wavy boundary.

Bk2—9 to 19 inches; dark gray (5YR 4/1) clay, dark brown (7.5YR 3/2) moist; moderate coarse angular blocky structure; rigid, firm, very sticky and very plastic; few fine and many very fine roots; few very fine dendritic tubular pores; few pressure faces on all faces of peds; strongly effervescent; disseminated carbonates and few nodules of segregated carbonates; moderately alkaline (pH 8.2); clear wavy boundary.

Bkss1—19 to 28 inches; dark gray (5YR 4/1) clay, dark brown (7.5YR 3/2) moist; moderate coarse wedge structure; extremely hard, firm, very sticky and very plastic; common very fine roots; few very fine dendritic tubular pores; few slickensides; strongly effervescent; disseminated carbonates and few nodules and coats of segregated carbonates; moderately alkaline (pH 8.2); clear wavy boundary.

Bkss2—28 to 39 inches; dark gray (5YR 4/1) clay, dark brown (7.5YR 3/2) moist; strong very coarse wedge structure; very hard, firm, very sticky and very plastic; few very fine roots; many slickensides; violently effervescent; disseminated carbonates and few nodules and coats of segregated carbonates; moderately alkaline (pH 8.2); clear wavy boundary.

Cr—39 to 47 inches; 60 percent light gray (2.5Y 7/2) and 40 percent white (10YR 8/1) moderately consolidated calcareous sandstone, light yellowish brown (2.5Y 6/3) moist; moderately cemented; violently effervescent; moderately alkaline (pH 8.3).

Range in Characteristics

Depth to soft sandstone ranges from 20 to 40 inches. When the soils are dry, vertical cracks that range from 0.5 to 4 inches in width extend from the surface to a depth of 67 inches. The cracks normally close for 120 to 150 consecutive days sometime in December through April. Intersecting slickensides occur in some horizon or horizons below the A horizon. The content of clay ranges from 35 to 60 percent. The content of rock fragments ranges from 0 to 3 percent. The fragments are pebbles and cobbles. Some pedons have a C horizon with texture of clay loam or silty clay loam. The mean annual soil temperature at a depth of 20 inches ranges from 58 to 63 degrees F. The calcium carbonate equivalent in the fine-earth fraction ranges from 4 to 9 percent, by weight.

The A horizon has dry color of 5YR 4/1 and moist color of 5YR 3/1, 3/2, or 4/1 or 7.5YR 3/1. The content of organic matter is 1 to 3 percent. Reaction is slightly alkaline or moderately alkaline.

The B horizon and the C horizon, where present, have dry color of 5YR 4/1 and moist color of 5YR 3/2 or 3/3 or 7.5YR 3/2. In nearly all pedons, these horizons have segregated carbonates.

Nord Taxadjunct

The Nord taxadjunct consists of very deep, well drained soils on fan skirts. These soils formed in coarse-loamy alluvium derived from mixed rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Coarse-loamy, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon

Nord loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 45 minutes, 58 seconds N. and long. 120 degrees, 55 minutes, 15 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

Ap—0 to 5 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine dendritic tubular pores; 5 percent gravel; slightly alkaline (pH 7.6); clear smooth boundary.

A—5 to 25 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine dendritic tubular pores; 5 percent gravel; slightly alkaline (pH 7.6); gradual wavy boundary.

C—25 to 50 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; massive; very hard, friable, moderately sticky and slightly plastic; few very fine roots; common very fine dendritic tubular pores; slightly effervescent; disseminated carbonates; 5 percent gravel; slightly alkaline (pH 7.6); gradual wavy boundary.

Ck—50 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; very hard, friable, moderately sticky and slightly plastic; few very fine roots; few very fine dendritic tubular pores; slightly effervescent; few fine filaments of carbonates; 5 percent gravel; slightly alkaline (pH 7.6).

Range in Characteristics

The content of gravel ranges from 0 to 5 percent.

The A horizon has dry color of 10YR 4/3, 5/1, 5/2, or 5/3 and moist color of 10YR 3/1, 3/2, or 3/3. Reaction ranges from neutral to moderately alkaline.

The C and Ck horizons have dry color of 10YR 5/3, 5/4, 6/3, or 6/4 and moist color of 7.5YR 4/4 or 10YR 3/3, 4/3, 4/4, or 5/3. The texture is stratified sandy loam, fine sandy loam, or loam. Disseminated or segregated carbonates are present below a depth or 40 inches. Reaction is slightly alkaline or moderately alkaline.

The Nord soil in map unit 201—Nord loam, 0 to 2 percent slopes, is a taxadjunct to the series because it has a regular decrease in organic carbon.

Pardee Series

The Pardee series consists of shallow, well drained soils on fan remnants. These soils formed in alluvium derived from mixed rock sources underlain by andesitic, tuffaceous conglomerate. Slopes range from 0 to 3 percent.

Taxonomic class: Loamy-skeletal, mixed, superactive, thermic Lithic Mollic Haploxeralfs

Typical Pedon

Pardee gravelly loam, 0 to 3 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 11 E., Mount Diablo Base and Meridian; lat. 37 degrees, 48 minutes, 8 seconds N. and long. 120 degrees, 47 minutes, 55 seconds W.; USGS Oakdale topographic quadrangle, NAD 27.

A—0 to 6 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine dendritic tubular pores; 20 percent gravel and 5 percent cobbles; slightly acid (pH 6.3); clear smooth boundary.

Bt—6 to 11 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; few very fine

dendritic tubular pores; common moderately thick clay films on faces of peds and lining pores; 50 percent gravel and 10 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

2R—11 inches; light gray (10YR 7/2) andesitic conglomerate, brown (10YR 5/3) moist.

Range in Characteristics

Depth to hard bedrock ranges from 10 to 20 inches. Reaction ranges from slightly acid to strongly acid.

The A horizon has dry color of 5YR 5/4 or 5/6 or 7.5YR 5/4, 5/6, or 6/4 and moist color of 5YR 3/4 or 7.5YR 3/4 or 4/4. The texture is gravelly loam or cobbly loam. The content of gravel ranges from 15 to 35 percent.

The Bt horizon has dry color of 5YR 4/4, 4/6, 5/4, or 5/6 or 7.5YR 5/4 or 5/6 and moist color of 5YR 3/4, 4/4, or 4/6 or 7.5YR 4/4 or 4/6. The texture is very gravelly loam, very cobbly loam, or very gravelly clay loam. The content of rock fragments ranges from 35 to 60 percent. The fragments are pebbles and cobbles.

Pentz Series

The Pentz series consists of shallow, well drained soils on hillslopes. These soils formed in material weathered from andesitic, tuffaceous siltstone. Slopes range from 5 to 50 percent.

Taxonomic class: Loamy, mixed, superactive, thermic, shallow Ultic Haploxerolls

Typical Pedon

Pentz silt loam in an area of Pentz-Peters association, 2 to 5 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 54 minutes, 2 seconds N. and long. 120 degrees, 50 minutes, 35 seconds W.; USGS Oakdale topographic quadrangle, NAD27.

A—0 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common fine interstitial, many medium tubular, and many very coarse tubular pores; 5 percent gravel; moderately acid (pH 5.7); clear wavy boundary.

Bw—6 to 10 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common medium tubular and many very fine dendritic tubular pores; 5 percent gravel; moderately acid (pH 6.1); clear wavy boundary.

Bt—10 to 12 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common medium tubular and many very fine dendritic tubular pores; few thin clay films on surfaces along root channels; 6 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

Cr—12 inches; yellowish brown (10YR 5/4, broken face) moderately consolidated andesitic siltstone, dark yellowish brown (10YR 4/4) moist.

Range in Characteristics

These soils are 10 to 20 inches deep over a paralithic contact. The content of rock fragments ranges from 0 to 35 percent. The fragments are pebbles and cobbles.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 7.5YR

3/2 or 10YR 3/2 or 3/3. The texture is fine sandy loam, loam, sandy loam, gravelly sandy loam, or silt loam. Reaction ranges from strongly acid to slightly acid.

The Bw and Bt horizons have dry color of 10YR 4/2, 4/3, 5/2, 5/3, 5/4, or 6/4 and moist color of 7.5YR 3/2 or 10YR 3/2, 3/3, 4/3, or 4/4. The texture is fine sandy loam, sandy loam, loam, gravelly sandy loam, or silt loam. Reaction ranges from moderately acid to neutral.

The Bw and Bt horizons have texture of clay loam or gravelly sandy loam in some pedons and silt loam in many pedons. These textures are outside the range specified in the official soil series description but do not significantly affect use and management.

Peters Series

The Peters series consists of shallow, well drained soils on hillslopes. These soils formed in residuum and colluvium derived from andesitic, tuffaceous sandstone. Slopes range from 0 to 8 percent.

Taxonomic class: Clayey, smectitic, thermic, shallow Typic Haploxerolls

Typical Pedon

Peters clay, 2 to 8 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 38 degrees, 2 minutes, 15 seconds N. and long. 120 degrees, 55 minutes, 36 seconds W.; USGS Oakdale topographic quadrangle, NAD 27.

A1—0 to 2 inches; brown (7.5YR 4/2) clay, very dark brown (7.5YR 2.5/2) moist; moderate fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; many fine and many very fine roots throughout; 1 percent metamorphic gravel; neutral (pH 7.1); clear wavy boundary.

A2—2 to 6 inches; brown (7.5YR 5/2) clay, very dark brown (7.5YR 2.5/2) moist; moderate thick platy structure parting to moderate coarse angular blocky; extremely hard, firm, very sticky and very plastic; common fine and common very fine roots throughout; 1 percent metamorphic gravel; slightly acid (pH 6.5); clear wavy boundary.

A3—6 to 14 inches; brown (7.5YR 5/2) clay, very dark brown (7.5YR 2.5/2) moist; weak very thick platy structure parting to moderate very coarse angular blocky; extremely hard, firm, very sticky and very plastic; few very fine roots throughout; 10 percent discontinuous distinct pressure faces on all faces of peds; 1 percent metamorphic gravel; neutral (pH 7.3); clear wavy boundary.

Cr1—14 to 15 inches; pinkish gray (7.5YR 6/2) clay, brown (7.5YR 5/2) moist; few very fine roots around fragments; 50 percent sandstone gravel; slightly alkaline (pH 7.4); abrupt wavy boundary.

Cr2—15 inches; pinkish gray (7.5YR 7/2) moderately consolidated andesitic sandstone, pale brown (10YR 6/3) moist.

Range in Characteristics

Depth to sandstone ranges from 10 to 20 inches. The content of gravel ranges from 0 to 10 percent. The content of cobbles ranges from 0 to 5 percent. Reaction ranges from moderately acid to neutral.

The A horizon has dry color of 7.5YR 4/2 or 5/2 or 10YR 2/1, 2/2, 3/1, 3/2, 4/1, 4/2, 5/1, or 5/2 and moist color of 7.5YR 3/2 or 4/2 or 10YR 2/1, 2/2, or 3/1. The texture is clay, silty clay, clay loam, or silty clay loam.

The Cr horizon has dry color of 7.5YR 7/2 or 10YR 5/1, 6/1, 6/2, 6/3, 7/2, or 8/1 and moist color of 7.5YR 4/2 or 10YR 4/4, 5/2, 5/3, or 6/2. The texture is clay or silty clay.

Redding Series

The Redding series consists of moderately deep, moderately well drained soils on fan remnants. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 30 percent.

Taxonomic class: Fine, mixed, active, thermic Abruptic Durixeralfs

Typical Pedon

Redding gravelly loam, 2 to 8 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 51 minutes, 40 seconds N. and long. 120 degrees, 53 minutes, 15 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

A1—0 to 8 inches; reddish brown (5YR 5/3) gravelly loam, reddish brown (5YR 4/3) moist; weak medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine dendritic tubular pores; 20 percent gravel; strongly acid (pH 5.3); clear smooth boundary.

A2—8 to 13 inches; reddish brown (5YR 5/3) gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine dendritic tubular pores; 25 percent gravel; moderately acid (pH 5.8); abrupt wavy boundary.

2Bt—13 to 22 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; strong medium subangular blocky structure; extremely hard, very firm, moderately sticky and moderately plastic; few very fine roots; common very fine dendritic tubular pores; common moderately thick clay films on faces of peds and lining pores; 10 percent gravel; slightly acid (pH 6.3); abrupt smooth boundary.

3Bqm—22 to 60 inches; reddish yellow (5YR 6/6) and yellowish red (5YR 5/6) strongly cemented duripan, yellowish red (5YR 4/6) moist; extremely hard; 35 percent gravel and 5 percent cobbles.

Range in Characteristics

Depth to a duripan ranges from 20 to 40 inches. Reaction ranges from strongly acid to slightly acid.

The A horizon has dry color of 5YR 5/3, 5/6, 6/3, or 6/4 or 7.5YR 5/4, 5/6, 6/4, or 6/6 and moist color of 5YR 3/6, 4/2, 4/3, or 4/4 or 7.5YR 4/4. The texture is gravelly sandy loam, gravelly loam, cobbly loam, or loam. The content of clay ranges from 10 to 30 percent. The content of gravel ranges from 5 to 30 percent. The content of cobbles ranges from 0 to 20 percent.

The 2Bt horizon has dry color of 2.5YR 4/6; 5YR 5/4, 5/6, 5/8, or 6/6; or 7.5YR 5/4 or 6/4 and moist color of 2.5YR 3/6; 5YR 4/3, 4/4, or 4/6; or 7.5YR 4/4 or 4/2. The texture is gravelly clay loam, clay loam, gravelly clay, or clay. The content of clay ranges from 35 to 60 percent. The content of gravel ranges from 0 to 35 percent. The content of cobbles ranges from 0 to 5 percent.

The 3Bqm horizon has dry color of 5YR 6/6; 7.5YR 6/6, 7/4, or 7/6; or 10YR 5/3 and moist color of 5YR 4/6, 5/4, or 5/6; 7.5YR 4/4 or 5/4; or 10YR 4/3.

San Joaquin Series

The San Joaquin series consists of moderately well drained soils that are moderately deep over a duripan and are on fan remnants. These soils formed in alluvium derived from granite. Slopes range from 0 to 5 percent.

Taxonomic class: Fine, mixed, active, thermic Abruptic Durixeralfs

Typical Pedon

San Joaquin sandy loam, 2 to 5 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 1 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 50 minutes, 17 seconds N. and long. 120 degrees, 52 minutes, 23 seconds W.; USGS Oakdale topographic quadrangle, NAD 27.

A—0 to 11 inches; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine dendritic tubular pores; neutral (pH 7.0); abrupt smooth boundary.

2Bt—11 to 24 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; few very fine roots; few very fine dendritic tubular pores; few thin clay films on faces of peds; few fine distinct very dark gray (10YR 3/1, moist) iron-manganese concretions and coatings; slightly alkaline (pH 7.6); abrupt smooth boundary.

2Bqm—24 to 60 inches; brown (7.5YR 5/4) strongly cemented duripan, dark brown (7.5YR 3/4) moist; extremely hard.

Range in Characteristics

Depth to a duripan ranges from 20 to 40 inches.

The A horizon has dry color of 5YR 5/3; 7.5YR 5/2, 5/4, 6/2, or 6/4; or 10YR 4/3, 5/3, 6/3, or 6/4 and moist color of 5YR 4/3; 7.5YR 3/2, 3/4, 4/2, 4/4, or 5/2; or 10YR 3/3, 4/3, 5/3, or 5/4. The texture is sandy loam or loam. Reaction is dominantly slightly acid or moderately acid but may be neutral where calcium carbonate has been added.

The Bt horizon, where present, has dry color of 5YR 5/4 or 5/6 or 7.5YR 5/4, 5/6, or 6/6 and moist color of 5YR 4/4 or 7.5YR 4/4. The texture is loam or sandy clay loam. Reaction ranges from neutral to moderately acid.

The 2Bt horizon has dry color of 5YR 3/3, 3/4, 4/3, 4/4, 4/6, 5/4, or 5/6 or 7.5YR 4/6, 5/2, 5/4, 5/6, 6/4, or 6/6 and moist color of 5YR 3/3, 4/4, or 4/6 or 7.5YR 3/4, 4/2, 4/4, 4/6, 5/4, or 5/6. The texture is clay loam or clay. Reaction ranges from slightly acid to slightly alkaline.

The 2Bqm horizon has dry color of 5YR 3/3, 4/3, 5/6, or 5/8; 7.5YR 4/6, 5/2, 5/4, 6/4, or 7/2; or 10YR 5/4, 5/6, or 7/3. Cementation ranges from strongly cemented to indurated.

Veritas Series

The Veritas series consists of moderately well drained soils that are deep over a duripan and are on low fan terraces. Some areas of these soils are artificially drained. These soils formed in coarse-loamy alluvium derived from mixed rock sources. Slopes range from 0 to 2 percent.

Taxonomic class: Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls

Typical Pedon

Veritas fine sandy loam, 0 to 2 percent slopes; Stanislaus County, California; in an unsectionalized area of T. 2 S., R. 10 E., Mount Diablo Base and Meridian; lat. 37 degrees, 47 minutes, 17 seconds N. and long. 120 degrees, 52 minutes, 57 seconds W.; USGS Escalon topographic quadrangle, NAD 27.

Ap—0 to 9 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable,

slightly sticky and slightly plastic; few very fine roots; moderately alkaline (pH 8.1); clear smooth boundary.

A—9 to 16 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine dendritic tubular pores; slightly alkaline (pH 7.6); gradual wavy boundary.

Bw1—16 to 31 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine dendritic tubular pores; slightly alkaline (pH 7.6); gradual wavy boundary.

Bw2—31 to 47 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine dendritic tubular pores; few medium distinct dark brown (10YR 3/3, moist) masses of oxidized iron; slightly alkaline (pH 7.6); abrupt wavy boundary.

2Bqm—47 to 60 inches; variegated light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) strongly cemented duripan, grayish brown (10YR 5/2) moist; extremely hard.

Range in Characteristics

Some pedons have 15 to 19 inches of silty clay loam overwash. Depth to a duripan ranges from 40 to 60 inches. Distinct or prominent redoximorphic features are at a depth of 30 to 40 inches.

The A horizon has dry color of 10YR 4/2, 5/1, or 5/2 and moist color of 10YR 3/1 or 3/2. The texture is sandy loam or fine sandy loam. Reaction ranges from neutral to moderately alkaline.

The Bw horizon has dry color of 10YR 5/1, 5/3, 5/4, 6/2, 6/3, or 6/4 and moist color of 10YR 4/1, 4/2, or 4/3. The texture is sandy loam or fine sandy loam. Reaction is slightly alkaline or moderately alkaline.

The Bk horizon, where present, has the same range in colors and textures as the Bw horizon.

The 2Bqm horizon has the same range in colors as the Bw horizon. Cementation ranges from strongly cemented to indurated.

Formation of the Soils

An understanding of the processes and factors of soil formation can add meaning to the relationships between the descriptive text, maps, and interpretive tables in this survey.

Soil is a natural body on the earth's surface. It provides a medium for plant growth and a habitat for animals and a myriad of microorganisms. Its three-dimensional organization has a changeable nature. It often teems with living creatures that are generating and metabolizing organic matter within a matrix of mineral material, air, and water. This matrix, in turn, houses a plethora of dissolved substances and suspended particles.

Processes of Soil Formation

Soils form from parent material as a function of transformations, transfers, additions, and losses. Each of these processes is related to both energy and matter.

Transformations involve biological, chemical, and physical operations. Rock weathering occurs. Larger fragments break into progressively smaller pieces, eventually resulting in the separation of primary minerals into clay minerals. Nutrient cycling is supported by an array of biochemical processes. Fire has caused significant transformations in the savannahs and grasslands in the survey area.

Transfers result in the vertical and lateral redistribution of matter and energy throughout the soil profile. Redistributions are influenced by gravity, energy gradients, and biological activity. Materials that are redistributed include solutions, gases, nutrients, organic matter, contaminants, and clay-sized particles.

Additions to the soil include solids, liquids, gases, and energy. The solids include soil particles and fragments eroded by water from higher elevations or moved downward by gravity. Particles are blown into, out of, and around the survey area by wind. Suspended particles, such as volcanic ash, can move from distant locations in the mountains before settling out of the air. Historically, organic matter has accumulated from the annual penetration of grass roots into the soils that support grassland and savannah in the San Joaquin Valley. Currently, many soils support cultivated cropland but retain a relatively high content of organic matter. Oxygen is the most important gas added from the above-ground atmosphere. Liquid is added by surface flow, rain, and snowmelt, all of which help to move dissolved and suspended nutrients into and through the soil profile. Contaminants are added primarily by human activities. Residential, agricultural, governmental, and industrial wastes are sources of soil contaminants. Energy is added by sunlight, fire, and exothermic chemical reactions.

Loses from the soil include solids, liquids, gases, and energy. Solids are removed by erosion. Liquids are lost downward by percolation through and out of the soil profile and upward by evaporation and transpiration. Gases that are lost into the atmosphere include carbon dioxide and methane. Gases within interparticulate spaces dissolve into water in the soil. Energy is removed by radiation and convection.

Horizon Formation

Soils are classified, mapped, and interpreted on the basis of the kind and arrangement of the layers, or horizons, in the soils. The degree to which soil horizons form is a reflection of the extent to which the soil-forming factors interact with one or more of the soil-forming processes. In this survey area, the diagnostic surface horizon having the most highly contrasting properties is the mollic epipedon. The most important diagnostic horizons below the surface horizon are the cambic horizons, argillic horizons, and duripans.

A mollic epipedon is a dark surface horizon that has high base saturation. It forms mainly through additions of organic material to the soil in the form of decomposed roots and organic surface residue. It may be the only diagnostic horizon in recent soils, or it may occur in combination with subsurface horizons in older soils. Pentz soils (Ultic Haploxerolls) and Peters soils (Typic Haploxerolls) have a mollic epipedon, mainly due to annual additions of organic material from decaying and dead grass roots. Soil climate also affects the formation of soil horizons and is explained under the heading “Climate and Biological Factors.”

The soils in the survey area that have a subsoil horizon have a cambic or argillic horizon. Cambic horizons are characterized by the redistribution or removal of water-soluble material, such as carbonates, to a different (lower) part of the profile. These changes in water soluble materials result in the alteration of the original rock structure in the parent material to form soil structure. Another result is the addition of enough illuvial clay to cause a measurable change in the color of a subsoil layer.

Argillic horizons are characterized by an accumulation of illuvial clay. They form when primary minerals in the layers above the zone of accumulation transform into silicate clays. Subsequently, clay is removed from the upper layers of the profile and deposited into the subsoil. Some of the clay in the argillic horizons formed in place as a result of weathering of primary minerals. With age, these horizons become finer textured and somewhat thicker. They may even be separated from the layer above by an abrupt boundary. Redding soils (Abruptic Durixeralfs) have an abrupt boundary at the top of or within the argillic horizon. They are commonly referred to as claypan soils because they are hard when dry and are restrictive regardless of moisture content. The claypan restricts the downward movement of water, gases, and roots. Claypan soils also restrict erosion of the landscape on which they form.

Some horizons below the surface horizon become strongly cemented, very strongly cemented, or indurated. Massive, platy, cemented horizons are duripans, which are commonly called “hardpans.” San Joaquin soils (Abruptic Durixeralfs) have an indurated duripan. Cementation is the result of in-place transformation of primary minerals into silica and iron sesquioxides, which act as cementing agents. Some silica and iron sesquioxides are translocated downward into the duripan from overlying horizons and some are translocated upward into the duripan by a fluctuating high water table. In the survey area, duripans are not necessarily related to the overlying profile.

Factors of Soil Formation

Soils forms through the interaction of the soil-forming processes with five soil-forming factors: climate, parent material, topography, living organisms, and time. The contribution of each factor to the formation of the whole soil differs at every location. Thus, soils may vary significantly within short distances. The influences of the soil-forming factors on the genesis and morphology of the soils in the survey area are summarized in the following sections.

Climate and Biological Factors

Northern Stanislaus County has a Mediterranean climate characterized by hot, dry summers and cool, moist winters. Most of the rain falls from mid-October to April. The soil temperature regime is thermic, and the soil moisture regime is either xeric or aquic. Microbiologically enhanced weathering is most active in the spring, when the soil conditions are warm and moist. During the spring, the rainy season is drawing to a close. Sufficient rain is seldom available during the spring to translocate weathered materials downward into the subsoil. From mid-October through April, rainwater carries dissolved materials through the soil. Suspended particles tend to move downward with the wetting front. Suspended particles drop out of suspension as the soil dries. The annual precipitation ranges from 14 to 18 inches (36 to 46 centimeters). Leaching is limited in the cool winter months, when the majority of the precipitation falls. The limitations on weathering and leaching allow bases to accumulate, resulting in mollic properties in the epipedons of Pentz and Peters soils (Ultic Haploxerolls and Typic Haploxerolls, respectively).

The air temperature in the survey area is moderated by the influence of the Pacific Ocean. The air temperature is slightly warmer during winter and slightly cooler during summer than is typical of the nearby survey areas that have similar soils. Because of these temperature variations, the content of organic matter in the surface layer is at the higher end of the range allowed for the respective series. An example is the Redding soils (Abruptic Durixeralfs). The relatively warmer winter temperatures allow for the production of more vegetation on the soils, and the relatively cooler summer temperatures decrease the activity of microorganisms. Because the decomposition of organic matter decreases, the amount of organic matter in the soil increases.

The rainfall in the survey area is sufficient to leach soluble salts out of soil profiles. Significant amounts of exchangeable bases, however, have been leached only from soils on the older landforms. This variation in the extent of leaching may reflect the length of time that leaching has occurred, or it may indicate that the climate in the past was wetter and more conducive to leaching. The soils on flood plains commonly have a base saturation of more than 90 percent throughout. On the older landforms, soils such as Abruptic Durixeralfs have a base saturation as low as 75 percent in some or all parts of the profile above the claypan. The Redding profile sampled for laboratory analysis exhibited base saturations of 73 and 81 in the two uppermost layers, respectively.

Present-day climatic variations result from the effects of topography and relief. Generally, with increasing elevation the temperature decreases and the amount of precipitation increases. As the amount of precipitation increases, the extent of leaching and the amount of vegetation also increase, resulting in an increased content of organic matter. Fluctuations in temperature and moisture affect the rates of decomposition and accumulation of organic matter and weathering of minerals. Soils on the older landforms have been effected by climatic conditions that differed from those of the current climate.

The activities of living organisms, including soil flora, fauna, and vegetation, are important biological forces that have affected soil formation in the survey area. Flora, such as bacteria and fungi, help to decompose organic matter. Some bacteria also add atmospheric nitrogen to the soil. Burrowing and tunneling by fauna, such as earthworms, small insects, and rodents, mix soil material. Krotovinas are abandoned tunnels filled with loose soil material from overlying horizons. They transmit water more readily than the surrounding undisturbed soil material. The activity of rodents, as evidenced by these krotovinas, is common in Pentz soils (Ultic Haploxerolls) and Amador taxadjunct soils (Typic Dystroxerepts).

The vegetation in the survey area has stabilized the land surfaces. Soil stability enhances the influence of the other soil forming factors. Vegetation increases stability

by protecting the surface against erosion. Plant roots inhibit soil creep on sloping surfaces and enhance the development of soil structure, aggregate stability, and porosity.

The survey area has three major types of plant community: riparian forest, annual grass, and oak savannah. Hydrophytic plants, such as tules and reeds, grow in the uncultivated backswamps. Small remnants of a broadleaf riparian forest remain in uncultivated areas of Columbia soils (Oxyaquic Xerofluvents) along the Stanislaus River. Annual grasses grow on most of the soils in the survey area that are not cultivated or developed for urban uses. An annual-grass blue-oak savannah grows in the eastern parts of the survey area above about 600 feet (180 meters) where oak trees have not been cleared. Auburn soils (Lithic Haploxerepts) dominate both the grassland below 600 feet and the savannah above 600 feet.

The accumulation of organic matter imparts a dark color to the surface layer of mineral soils. The content of organic matter is highest in soils that produce large amounts of vegetation and that are subject to periodic saturation. Excessive moisture reduces the rate of decomposition by removing the oxygen required for the activity of typical microorganisms. Commonly, these soils receive additional moisture because of flooding or a high water table. An example is the Clear Lake soils (Xeric Endoaquerts), which have a seasonal high water table and are subject to flooding. Uncultivated sites generate an abundance of annual grasses and forbs and some hydrophytic plants.

Parent Materials and Time

The presence of many highly contrasting soils in the survey area can be explained in part by the variety of parent materials in the area. Honcut soils (Typic Xerorthents) are forming in coarse textured alluvium dominated by deposits weathered from granitoid rocks. The source of the granitoid materials is the upper reaches of the Stanislaus River watershed in the Sierra Nevada Mountains. In contrast, Clear Lake soils are forming in fine textured alluvium dominated by deposits weathered from andesitic, tuffaceous sandstone. The sandstone is considered to be associated with the Mehrten Formation and developed during the Miocene to late Pliocene epochs (Marchand and Allwardt, 1981), 7 to 15 million years before present (YBP).

Another soil series that is forming from andesitic, tuffaceous sandstone is the Pentz soils, which are forming in coarse textured residuum. The residuum consists of unconsolidated mineral material that accumulates as the andesitic, tuffaceous sandstone disintegrates in place.

Amador taxadjunct soils are also forming in residuum. There are noticeable differences in percent base saturation and pH between the Pentz soils and the Amador taxadjunct soils. These differences stem from the Amador taxadjunct soils forming in parent material derived from the breakdown of tuffaceous rhyolite. The geologic reference and identification for this rhyolite is the Valley Springs Formation from the Oligocene and Miocene epochs (Marchand and Allwardt, 1981), 15 to 30 million YBP.

Mckeonhills soils (Aridic Haploxererts) are forming in material disintegrating from mudstone that formed from sediments deposited during the Tertiary period, 3 to 70 million YBP. The source of the mudstone is not known, but the mudstone probably formed during the Eocene epoch when an inland sea occupied the current location of the Central Valley (Konigsmark, 2002).

Auburn soils are forming in material derived from the in situ weathering of dominantly metamorphosed basalt associated with the Gopher Ridge Formation. The metamorphosis is thought to have been taking place throughout much of the Mesozoic era (Tolhurst, 2006), 70 to 225 million YBP.

Landforms and Time

The overall landscape in the survey area, mainly the hills, fan remnants, and valleys, is the result of the stratigraphic and structural control exerted by plate tectonic activity occurring over hundreds of millions of years. The present topography and landforms, however, are primarily the result of events that occurred during the Quaternary period, 0 to 2.5 million YBP. The kinds of soils that formed relate to the stability of the landform surfaces on which they occur. The degree of development in diagnostic horizons below the surface horizon indicates that the age of the soils in the survey area ranges from the present to the early Pleistocene epoch, 2.5 million YBP (Davis and Hall, 1959).

The survey area has a wide variety of landforms, including flood plains, alluvial fans, fan remnants, dunes, stream terraces, and hills. The landform development can be explained to a significant extent as a result of geotectonic uplift and subsequent erosional downcutting.

The youngest landforms in the survey area are flood plains. These are active surfaces along drainageways, including the Stanislaus River, the Calaveras River, and creeks. Bar-and-channel topography is evident along the rivers in uncultivated areas that have not been modified by dredge tailings. The flood plains are frequently flooded, except where they are protected by levees or upstream dams. Even where protected, the landscape along the rivers is occasionally altered by new channel cutting, old channel abandonment, stream meandering, and downstream alluvial deposition. Alterations are most noticeable in areas dominated by Xerofluvents, which are exemplified by Columbia soils. Bar-and-channel topography is strikingly expressed in the Xerofluvents. In the survey area, the Stanislaus River has mainly deposited granitoid materials that washed down from the upper reaches of the river in the high Sierra Nevada Mountains. The Calaveras River and the creeks have deposited alluvium derived from mixed rock sources. The alluvium is dominantly metamorphic rock because the headwaters of the Calaveras River and the creeks are primarily in the metamorphic belt region of the Western Sierra Nevada Mountains.

The major drainageways were originally confined within broad natural levees sloping away from the rivers, but in recent times they have been confined by constructed levees. The natural levees were made up of alluvium deposited during periods of flooding. The coarser textured material was deposited in the areas nearest the rivers, and the finer textured material settled out in the areas farther from the rivers. Most of the natural levees have been leveled and are no longer evident on the landscape. Remnants of original, unleveled flood plains are directly adjacent to the present channels of the Stanislaus River. The Columbia soils in these areas have been stabilized by riparian trees and shrubs.

Soils in basins include Hollenbeck, Clear Lake, and Capay Taxadjunct soils (Chromic Haploxererts, Xeric Endoaquerts, and Typic Calcixererts, respectively). The clayey material in these soils is dominantly montmorillonitic. It shrinks when dry and swells when wet. As a result, horizontal cracks to a depth of 3 feet are not uncommon. The cracks repeatedly receive soil material containing organic matter from the surface, so organic matter does not accumulate significantly on the surface. The soils had a fluctuating water table before they were drained and protected from flooding. The fluctuating water table resulted in the segregation and accumulation of iron and manganese oxide in the form of stains or small, rounded concretions or pellets. Fluctuation of the water table also resulted in the accumulation of secondary carbonates. These soils have been stable long enough to form intersecting slickensides and wedge-shaped aggregates during the alternating periods of wetting and drying. The shrinking and swelling tends to obliterate other morphological characteristics that would otherwise develop within the soil profile.

The soils on dunes include Delhi soils (Typic Xeropsamments). These soils formed in wind-modified alluvium on an alluvial fan along the Stanislaus River. Much of the area dominated by flood plains and alluvial fans in the southwestern corner of the survey area originally had undulating dunes that have been leveled and stabilized by cultivated plants.

Alluvial fans converge with fan remnants in interfan basins. Cogna soils (Calcic Pachic Haploxerolls) are on the lower part of the fans and are therefore subject to rare flooding. Exeter soils (Typic Durixeralfs) are on fan remnants that are not subject to flooding. Soils on stream terraces are of minor extent in the survey area. They are in positions about 2 to 8 feet higher than the bottom of the adjacent drainageways. An example is the Hicksville soils (Mollic Haploxeralfs), which have a massive, hard, dark surface layer and an argillic horizon.

The soils on low fan remnants include San Joaquin and Madera soils (both Abruptic Durixeralfs) and Jahant soils (Mollic Palexeralfs). These soils generally are nearly level, and extensive areas have slopes of less than 1 percent. Drainage patterns are not evident in areas that have not been leveled. Soils on low fan remnants exhibit evidence of mature profile development. They commonly have a duripan and an argillic horizon with an abrupt textural change at or near its upper boundary. Illuviation of clay from the surface and weathering of clay in place are major sources of the clay in the claypan. Other than the abrupt boundary, the soils show no consistent evidence of a lithologic discontinuity at the claypan contact. Irregular changes in the distribution of individual sand-sized fractions and changes in mineral composition are not evident. Small changes in the amount of some sand-sized fractions are evident. Silica, derived from the granitoid component of the parent material and volcanic ash, is the primary cementing agent in the duripan. Iron and manganese are accessory cementing agents along with traces of calcium carbonate in some areas. Although the exact age of the duripan is not known, the majority of the soils that formed in material of the Riverbank Formation were laid down during the Pleistocene epoch, 130,000 to 450,000 YBP (Davis and Hall, 1959). Some areas on the low fan remnants have been scoured. In areas where severe scouring and subsequent redeposition have occurred, Exeter soils (Typic Durixeralfs) are forming. Exeter soils do not have a claypan but have a surface layer, an argillic horizon, and a duripan similar to those in San Joaquin soils.

Soils on undulating to rolling, dissected fan remnants are slightly higher than the soils on low fan remnants. Cometa soils (Typic Palexeralfs) are on a complex landform identified as the Turlock Lake Formation of the mid-Pleistocene epoch, 450,000 to 1,000,000 YBP (Davis and Hall, 1959). Cometa soils are underlain by a dense, weakly cemented layer that shows evidence of pedogenesis but does not qualify as a duripan. Cometa soils generally are on midslopes and toeslopes in the more dissected areas. They are also on knolls in the less dissected areas. The soils on high fan remnants include Redding and Bellota soils (both Abruptic Durixeralfs). These are the oldest fan remnants in the survey area and consist of the Arroyo-Seco or North Merced Gravels Formation of the late Pleistocene epoch, 1 to 2 million YBP, and the Laguna Formation of the early Pleistocene epoch, 2 to 3 million YBP (Davis and Hall, 1959). Consequently, the soils on the high fan remnants are the oldest in the survey area. They are mature soils that have a strongly developed profile. Redding soils have both a claypan and a duripan. The argillic horizon is characterized by an abrupt textural change at the claypan surface. The clay content increases by at least 15 percent at the claypan surface. The duripan consists of metamorphosed gravel, with or without cobbles, and a sandy granitoid matrix indurated by silica and iron. The source of the silica is the same as that of the soils on low fan remnants.

The soils on hills in the eastern part of the survey area include Pentz and Keyes soils. Both are shallow over andesitic, tuffaceous sandstone of the Mehrten Formation generated during the Miocene to late Pliocene epochs (Marchand and

Allwardt, 1981), 7 to 15 million YBP. The Mehrten Formation in this area consists of conglomerate, sandstone, siltstone, and claystone derived from andesitic source material. Keyes soils (Abruptic Durixeralfs) have a claypan and a thin duripan, indicating that these soils formed in Turlock Lake granitoid deposits laid down 450,000 to 1,000,000 YBP (Davis and Hall, 1959).

The soils on hills east of the Mehrten Formation include Amador taxadjunct soils and Mckeonhills soils. Amador soils are shallow over tuffaceous rhyolite of the Valley Springs Formation (fig. 6). The rhyolite was laid down in a sequence of rhyolitic sandstone, siltstone, claystone, and conglomerate that appears to have been deposited by streams. Like the Mehrten Formation, the materials of the Valley Springs Formation are paralithic. The rhyolite bedding planes tilt upward toward the east. Much of the tilt is thought to be a function of regional uplift that has been occurring over the last 5 million years in the formative phases of the Sierra Nevada Mountains (Marchand and Allwardt, 1981).

Auburn soils are on hills east of the Valley Springs Formation. The Auburn soils are shallow over metamorphosed basalt identified with the Gopher Ridge Formation.

Figure 6.—Rhyolitic bedding planes 1 mile south of Black Hill.

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Glossary

AASHTO classification. A system for classifying soils for geotechnical engineering purposes. It is related to highway and airfield construction and is based on particle-size distribution and Atterberg limits.

AASHTO group index number (GIN). An empirical index number used to evaluate clayey and silty clay material.

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Andesite. A group of dark-colored, fine-grained extrusive igneous rocks, generally porphyritic and exhibiting flow texture, with phenocrysts of quartz and sodic feldspar in a glassy cryptocrystalline groundmass. Also, any rock in that group. Andesite is the extrusive equivalent of diorite.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aridic moisture regime. A soil moisture regime in which the soils are dry for at least one-half of the year. This moisture regime is commonly in areas that have an aridic climate and is in a few areas that have a semiarid climate. In semiarid areas, the soils either have physical properties that keep them dry, such as a crusty surface that virtually precludes the infiltration of water, or have steep slopes with a high rate of runoff. Little, if any, leaching occurs in soils in this moisture regime, and soluble salts accumulate in the soils if there is a source of salts.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks, cut in unconsolidated material. An arroyo is sometimes called a

wash. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed. Arroyo-like landforms that intersect an area of ground-water discharge are more properly classified as intermittent stream channels.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The volume of water that should be available to plants if the soil, inclusive of fragments, were at field capacity. It is commonly estimated as the difference between the amount of water at field capacity and the amount at wilting point with adjustments for salinity, fragments, and rooting depth. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	more than 10.0

AWC (in tables). See Available water capacity.

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes commonly are bounded by a convex shoulder above and a concave footslope below. They may or may not include cliff segments (i.e., free faces). Backslopes are commonly erosional forms produced by mass movement, colluvial action, and running water.

Backswamp. A flood plain landform. Backswamps are extensive, marshy, or swampy, depressed areas of flood plains between natural levees and valley sides or stream terraces.

Bar (microfeature). A small, sinuous or bow-shaped, ridgelike lineation separated from others similar to it by small channels. It is caused by fluvial processes and is common on flood plains and young alluvial terraces. It is a constituent of bar and channel topography.

Bar (stream bar). A general term for a ridgelike accumulation of sand, gravel, or other alluvial material in the channel, along the banks, or at the mouth of a stream where a decrease in velocity induces deposition. Examples are channel bars and meander bars.

Bar and channel topography. A local topography of recurring, small, sinuous or bow-shaped ridges separated by shallow troughs irregularly spaced across low-relief flood plains. Slopes generally range from 2 to 6 percent. The effect is a subdued, sinuously undulating surface that is common on active flood plains. Differences in micro-elevation generally range from less than 1 meter to 2 meters. The differences in elevation between the bars and channels are largely controlled by the competency of the stream. The ridgelike bars commonly consist of sediment that is coarser than the sediment of the lower lying areas.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Basin. The nearly level to gently sloping bottom surface of a wide structural depression between mountain ranges.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. A general term for the solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Breccia. A coarse-grained, clastic rock composed of angular broken rock fragments held together by a mineral cement or in a fine-grained matrix.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Bulk density. A measurement of the oven-dry weight of the soil material that is less than 2 millimeters in diameter per unit volume. Commonly, measurements are taken at $^{1}/_{3}$-, $^{1}/_{10}$-, or 15-bar moisture tension. Bulk density influences plant growth and engineering applications. It is used to convert measurements from a weight basis to a volume basis. Within a family particle-size class, bulk density is an indicator of how well plant roots are able to extend into the soil. Bulk density is used to calculate porosity.

C (in tables). Clay.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Calcic horizon. A mineral soil horizon of secondary carbonate enrichment. The horizon is more than 15 centimeters thick and has a calcium carbonate equivalent that is more than 15 percent and at least 5 percent higher than the underlying horizon.

Calcium carbonate equivalent. The amount of calcium carbonate in a soil measured by treating the soil sample with hydrochloric acid (HCL). The evolved carbon dioxide (CO_2) is measured, and the amount of carbonate is then calculated as calcium carbonate ($CaCO_3$).

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Cambic horizon. A mineral soil horizon that has texture of loamy very fine sand or finer, has soil structure rather than rock structure, and contains some weatherable minerals. It is characterized by the alteration or removal of mineral material as indicated by mottling or gray color, stronger chroma or redder hue

than the underlying horizons, or the removal of carbonates. The cambic horizon lacks cementation or induration and has insufficient evidence of illuviation to meet the requirements for an argillic horizon.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence of soils on a landscape that are about the same age and formed in similar kinds of parent material under similar climatic conditions but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity (CEC). The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

CEC. See Cation-exchange capacity.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clayey soil. Sandy clay, silty clay, or clay.

Claypan. A dense, compact, slowly permeable layer in the subsoil that has a much higher content of clay than the overlying material. A claypan commonly is hard when dry and plastic or sticky when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. See Rock fragments.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility percent.

Colluvium. Unconsolidated, unsorted earth material transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g. direct gravitational action) and by local, unconcentrated runoff.

Compaction. The process by which the soil grains are rearranged in a manner that decreases void space and brings the grains into closer contact with one another, thereby increasing bulk density.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter, commonly with a matrix of sand and finer textured material. Cementing agents include silica, calcium carbonate, and iron oxide. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Deep soil. See Depth, soil.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to bedrock (in tables). Bedrock is too near the surface for the specified use.

Dip. A geomorphic component of flat plains, such as a lake plains, low coastal plains, or low-relief till plains. It consists of a shallow and typically closed depression that tends to be an area of focused groundwater recharge but not a permanent water body and that lies slightly lower and is wetter than the adjacent talf. A dip favors the accumulation of fine sediments and organic materials.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area.

Draw. A small stream channel that generally is more open and has a broader floor than a ravine or gulch.

Dune. A low mound, ridge, bank, or hill of loose, windblown, granular material (generally sand), either barren or covered with vegetation, that is capable of movement from place to place but always retains its characteristic shape.

Duripan. A subsurface soil horizon that is cemented with illuvial silica, commonly in opal or microcrystalline forms, to the degree that less than 50 percent of the volume of air-dry fragments slakes in water or hydrochloric acid.

EC (in tables). See Electrical conductivity.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Electrical conductivity (EC). The electrolytic conductivity of an extract from saturated soil paste.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian material. Material transported and deposited by wind, including earth material such as dune sand, sand sheets, loess, and clay.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Extrusive. Pertaining to igneous rock and sediment derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface, including lava flows and tephra deposits.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant. A general term for a landform that is the remaining part of an older fan landform, such as an alluvial fan, fan apron, inset fan, or fan skirt. It has been either dissected (an erosional fan remnant) or partially buried (a nonburied fan remnant). An erosional fan remnant must have a relatively flat summit that is a relict fan surface. A nonburied fan remnant is a relict surface in its entirety.

Fan skirt. A landform comprised of laterally coalescing, small alluvial fans that merge along their toeslopes with the basin floor. Fan skirts are smooth and ordinarily do not comprise component landforms.

Fan terrace. See Fan remnant.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. The nearly level plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is commonly a constructional landform consisting of sediment deposited during overflow and lateral migration of a stream.

Fluvial. Of or pertaining to rivers; produced by river action.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragments. Unattached cemented pieces of bedrock, bedrocklike material, durinodes, concretions, and nodules 2 or more millimeters in diameter in mineral soils and woody material 20 or more millimeters in diameter in organic soils.

FS (in tables). Fine sand.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the direction of the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content. These soils have large amounts of smectitic clay.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Granitic. Generally pertaining to an igneous intrusive rock of felsic to intermediate composition. The rock is like granite but is not necessarily true granite. Commonly, the term is applied to granite, quartz monzonite, granodiorite, and diorite.

Granite. A felsic igneous intrusive rock containing quartz and orthoclase with smaller amounts of sodic plagioclase and commonly muscovite.

Granitoid. See Granitic.

Granodiorite. An igneous intrusive rock that is intermediate between felsic and mafic in composition and contains quartz and somewhat more plagioclase than orthoclase.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides cut by the concentrated, but intermittent, flow of water commonly during and immediately following heavy rainfall or following icemelt or snowmelt. A gully generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum content. The percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A generic term for an area of the land surface that rises as much as 1,000 feet (300 meters) above surrounding lowlands, commonly has restricted summit area relative to surrounding surfaces, and has a well-defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and commonly is dependent on local usage.

Holocene. The epoch of the Quaternary Period of geologic time that extends from the end of the Pleistocene Epoch (about 10 to 12 thousand years ago) to the present.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hummock. Rounded or conical mound or other small rise.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil

profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Inset fan. Specific name for the flood plain of an ephemeral stream that is confined between fan remnants, ballenas, basin floor remnants, or closely opposed fan toeslopes of a basin.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that does not flow throughout the year (is commonly dry for 3 or more months of the year) and has a channel that is generally below the local water table. It flows only when it receives base flow during wet periods or when it receives ground-water discharge or protracted contributions from melting snow or other erratic surface and shallow subsurface sources.

Intrusive. Pertaining to igneous rock derived from molten matter (magma) that invaded pre-existing rock and cooled below the surface of the earth.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Level basin (or paddy).—Water is applied to a level plain surrounded by levees or dikes.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

K factor. A measurement of potential soil erodibility caused by detachment of soil particles by water.

Lacustrine deposit. Clastic sediment and chemical precipitates deposited in lakes.

Lahar. A mudflow composed chiefly of volcaniclastic materials on the flank of a volcano. The debris carried in the flow includes pyroclasts, blocks of primary lava flows and epiclastic materials.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

LCOS (in tables). Loamy coarse sand.

Leaching. The removal of soluble material from soil or other material by percolating water.

LEP. See Linear extensibility percent.

LFS (in tables). Loamy fine sand.

Limestone. A sedimentary rock consisting of more than 50 percent calcium carbonate, dominantly in the form of calcite. Limestone is commonly formed by a combination of organic and inorganic processes and includes chemical and clastic (soluble and insoluble) constituents. Fossils are common in limestone.

Linear extensibility percent (LEP). The linear expression of the volume difference between the water content of the natural soil fabric at $^{1}/_{3}$-bar or $^{1}/_{10}$-bar and oven dryness. The volume change is reported as a percent for the whole soil.

Liquid limit (LL). The moisture content at which the soil passes from a plastic to a liquid state.

LL. See Liquid limit.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

LS (in tables). Loamy sand.

LVFS (in tables). Loamy very fine sand.

Magma. Molten rock material that originates deep in the earth and solidifies to form igneous rock.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement in the earth's crust. Nearly all such rocks are crystalline. Examples are schist, gneiss, quartzite, slate, and marble.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. See Depth, soil.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface that rises more than 1,000 feet (300 meters) above surrounding lowlands, commonly has limited summit area relative to surrounding surfaces, and generally has steep sides (slopes of more than 25 percent) with or without considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic and/or volcanic activity and by differential erosion.

Mudstone. A blocky or massive, fine-grained sedimentary rock indurated by clay and silt in approximately equal amounts. Also, a general term used for clay, silt, claystone, siltstone, shale, and argillite but only when the amounts of clay and silt are not known or cannot be precisely determined.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

OM (in tables). See Organic matter.

Organic matter (OM). Plant and animal residue in the soil in various stages of

decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated and chemically weathered mineral and organic material in which the solum of a soil is formed as a result of pedogenic processes.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Perched water table. The upper surface of unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

Percolation. The downward movement of water through the soil.

Permafrost. Soil or rock that has remained at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

PI (in tables). See Plasticity index.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index (PI). The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau. A comparatively flat area of great extent and elevation. Specifically, an extensive land region considerably elevated (more than 100 meters) above adjacent lower lying terrain and commonly limited on at least one side by an abrupt descent. A relatively large part of a plateau surface is near the summit level.

Pleistocene. An epoch of the Quaternary Period of geologic time, following the Pliocene Epoch and preceding the Holocene (from approximately 2 million to 10 thousand years ago); also the corresponding (time-stratigraphic) "series" of earth materials.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Pyroclastic. Pertaining to fragmental material produced by commonly explosive aerial ejection of clastic particles from a volcanic vent. Such material may accumulate on land or under water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community differs from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind, proportion, and total production.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Relief. The elevations or inequalities of a land surface, considered collectively.

Remnant. The remaining part of a larger landform or land surface that has been dissected or partially buried.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rhyolite. A group of extrusive igneous rocks, generally porphyritic and exhibiting flow texture, with phenocrysts of quartz and alkali feldspar in a glassy cryptocrystalline ground mass. Also, any rock in that group. Rhyolite is the extrusive equivalent of granite.

Rill. A small steep-sided channel resulting from erosion. It is cut by a concentrated, but intermittent, flow of water, usually during and immediately following moderate rains or following icemelt or snowmelt. Generally, a rill is not an obstacle to wheeled vehicles and is shallow enough to be obliterated by ordinary tillage.

Rise. A geomorphic component of flat plains, such as lake plains, low coastal plains, or low-gradient till plains. It consists of a slightly elevated but low, broad area with a low slope gradient (1 to 3 percent slopes). Typically a rise is a microfeature, but it can be fairly extensive. Commonly, soils on a rise are better drained than those on the surrounding talf.

Riverwash. Barren alluvial areas of unstabilized sand, silt, clay, or gravel reworked frequently by stream activity.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bedrock, excluding lava and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline-sodic soil. A soil that contains sufficient exchangeable sodium to interfere with the growth of most crops and appreciable quantities of soluble salts. In a saline-sodic soil, the exchangeable sodium ratio is greater than 0.15 and, when the soil is saturated, the conductivity of the soil solution is greater than 4 decisiemens per meter (at 25 degrees C) and the pH is commonly 8.5 or less.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to

2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sand sheet. A large, irregularly shaped, commonly thin, superficial mantle of eolian sand, lacking the discernible slip faces that are common on dunes.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand and loamy sand.

SAR. See Sodium adsorption ratio.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

SC (in tables). Sandy clay.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under “normal” low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, marine deposits, e.g., sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by induration of a deposit of clay, silty clay, or silty clay loam and tending to split into thin layers.

Shallow soil. See Depth, soil.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

SIC (in tables). Silty clay.

Side slope. A geomorphic component consisting of a laterally planar area of a hillside. The overland flow of water is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A closed depression formed either by the solution of the surficial material, such as limestone, gypsum, and salt, or by the collapse of underlying caves. Complexes of sinkholes in carbonate-rich terrain are the main components of karst topography.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 percent and higher

Classes for complex slopes are as follows:

Nearly level	0 to 2 percent
Undulating	2 to 5 percent
Gently rolling	5 to 8 percent
Rolling	8 to 15 percent
Hilly	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 percent and higher

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil erodibility factors. The Kw and Kf factors quantify the susceptibility of soil to detachment by water. These erodibility factors predict the long-term average soil loss which results from sheet and rill erosion when various cropping systems and conservation techniques are used. The whole soil is considered in the Kw factor, but only the fine-earth fraction, which is the material less than 2 millimeters in diameter, is considered in the Kf factor.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons.

Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of rock fragments in a soil. In cross section, the line may be marked only by scattered fragments or it may be a discrete layer of fragments. The fragments are more commonly pebbles or cobbles than stones. A stone line generally overlies material that was subject to weathering, soil formation, and erosion before deposition of the overlying material. Many stone lines seem to be buried erosion pavements, originally formed by running water on the land surface and concurrently covered by surficial sediment.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Formed, arranged, or laid down in layers. The term refers to geologic deposits. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during an earlier period of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsidence. The decrease in surface elevation as a result of the drainage of wet soils that have organic layers or semifluid mineral layers.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

T factor. The soil-loss tolerance factor. It is the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. The quality of the soil includes the usability of the surface soil as a seedbed for plants, the condition of the atmosphere-soil interface needed to allow the entry of air and water into the soil and still protect the underlying soil from wind erosion and water erosion, and the total volume of soil as a reservoir for water and plant nutrients.

Talf. A geomorphic component of flat plains, such as lake plains, low coastal plains, or low-gradient till plains. It consists of an essentially flat (0 or 1 percent slopes), broad area dominated by closed depressions and a nonintegrated or poorly integrated drainage system. Precipitation tends to pond locally, and lateral transport is slow both above and below ground, favoring the accumulation of organic matter and the retention of fine-earth sediments. Better drained soils are commonly adjacent to drainageways.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Temperature regime, soil. A system that categorizes, for taxonomic purposes, general, long-term soil temperature conditions at the standard depth of 20 inches or at the surface of the bedrock, whichever is shallower. The various regimes are defined according to the freezing point of water or the high and low extremes for significant biological activity. The regimes, which are defined in “Keys to Soil Taxonomy,” are outlined as follows:

Pergellic.—Soils that have a mean annual temperature of less than 32 degrees F and have permafrost.

Cryic.—Soils that have a mean annual temperature of 32 to 47 degrees F and remain cold in summer.

Frigid.—Soils that have a mean annual temperature similar to that of the cryic regime but have a mean summer temperature at least 9 degrees warmer.

Mesic.—Soils that have a mean annual temperature of 47 to 59 degrees F and have a difference of more than 9 degrees between the mean summer and mean winter temperature.

Thermic.—Soils that have a mean annual temperature of 59 to 72 degrees F and have a difference of more than 9 degrees between the mean summer and mean winter temperature.

Hyperthermic.—Soils that have a mean annual temperature of more than 72 degrees F and have a difference of more than 9 degrees between the mean summer and mean winter temperature.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terrace (geomorphologic). A steplike surface bordering a valley floor or shoreline that represents the former position of a flood plain, lake, or seashore. The term is commonly applied to both the relatively flat summit surface (tread) that has been cut or builtup by stream or wave action and the steeper descending slope (scarp or riser) that grades to a lower base level of erosion. Practically, terraces are considered to be generally flat alluvial areas above the 100-year flood stage.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." In the tables, the textures are abbreviated as: *C—clay, CL—clay loam, COS—coarse sand, COSL—coarse sandy loam, FS—fine sand, FSL—fine sandy loam, L—loam, LCOS—loamy coarse sand, LFS—loamy fine sand, LS—loamy sand, LVFS—loamy very fine sand, S—sand, SC—sandy clay, SCL—sandy clay loam, SI—silt, SIC—silty clay, SICL—silty clay loam, SIL—silt loam, SL—sandy loam, VFS—very fine sand,* and *VFSL—very fine sandy loam.*

Thermic temperature regime. See Temperature regime, soil.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat or gently sloping surface of natural steplike landforms, commonly one of a series, such as successive stream terraces.

Tuff. A generic term for any consolidated or cemented deposit that is 50 percent volcanic ash (less than 2 millimeters in size). Various types of tuff can be recognized by their composition; acidic tuff is dominantly acidic particles and basic tuff is dominantly basic particles.

Unified soil classification. A system for classifying mineral and organic soils for engineering purposes based on particle-size characteristics, liquid limit, and plasticity index.

Upland (geomorphologic). A general term for the higher ground of a region, in contrast with low adjacent land, such as a valley or plain. Land at a higher elevation than the flood plain or low stream terrace and land above the footslope zone of the hillslope continuum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) that fills or partly fills a valley.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Vegetative cover. The crown cover of all live plants in relation to the ground surface.

Very deep soil. See Depth, soil.

Very shallow soil. See Depth, soil.

VFS (in tables). Very fine sand.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water table. The upper surface of ground water or the level below which the soil is saturated by water. Also, the top of an aquifer.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

WEG. See Wind erodibility group.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be

easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Wind erodibility group (WEG). A group of soils that have similar properties affecting their resistance to wind erosion in cultivated areas.

Windthrow. The uprooting and tipping over of trees by the wind.

Xeric moisture regime. A soil moisture regime in which the soils are moist and cool in winter and warm and dry in summer. It is the typical regime in areas that have a Mediterranean climate. When potential evapotranspiration is at a minimum, the moisture, which falls in winter, is particularly effective in leaching. The soils have a mean annual temperature of less than 22 degrees C and have a difference of at least 6 degrees between the mean summer and mean winter temperature.

Tables

Table 1.--Temperature and Precipitation

[Recorded in the period 1971-2000 at Modesto, California]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Max. temp. higher than	2 years in 10 will have-- Min. temp. lower than	Average number of growing degree days*	Avg.	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch	Average snowfall
	°F	*°F*	*°F*	*°F*	*°F*	*Units*	*In*	*In*	*In*		*In*
January----	54.3	39.2	46.8	69	26	31	2.56	0.69	4.31	5	0.0
February---	62.3	42.6	52.5	76	29	99	2.36	0.68	3.85	5	0.0
March------	67.6	45.3	56.5	83	33	208	2.33	0.41	4.50	5	0.0
April------	74.2	48.4	61.3	94	38	340	0.90	0.26	1.42	2	0.0
May--------	81.6	53.1	67.3	100	42	538	0.57	0.00	0.86	1	0.0
June-------	88.7	58.1	73.4	106	47	702	0.13	0.00	0.26	0	0.0
July-------	93.7	61.3	77.5	107	52	852	0.05	0.00	0.01	0	0.0
August-----	92.2	60.7	76.5	106	52	821	0.06	0.00	0.00	0	0.0
September--	87.9	57.9	72.9	103	48	687	0.27	0.00	0.26	0	0.0
October----	78.3	51.6	64.9	96	39	463	0.78	0.07	1.44	1	0.0
November---	64.1	43.4	53.8	80	31	138	1.45	0.20	2.75	3	0.0
December---	54.3	38.0	46.2	39	25	24	1.68	0.46	3.00	4	0.0
Yearly:											
Average--	74.9	50.0	62.5	---	---	---	---	---	---	---	---
Extreme--	111	19	---	109	24	---	---	---	---	---	---
Total----	---	---	---	---	---	4,903	13.15	7.99	17.18	26	0.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

[Recorded in the period 1971-2000 at Modesto, California]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Dec. 22	Feb. 2	Mar. 2
2 years in 10 later than--	---	Jan. 22	Feb. 21
5 years in 10 later than--	---	Dec. 28	Feb. 1
First freezing temperature in fall:			
1 year in 10 earlier than--	Jan. 14	Dec. 2	Nov. 14
2 years in 10 earlier than--	---	Dec. 12	Nov. 22
5 years in 10 earlier than--	---	Jan. 7	Dec. 7

Table 3.--Growing Season

[Recorded in the period 1971-2000 at Modesto, California]

Probability	Daily Minimum Temperature During growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	*Days*	*Days*
9 years in 10	>365	316	264
8 years in 10	>365	318	279
5 years in 10	>365	>365	307
2 years in 10	>365	>365	335
1 year in 10	>365	>365	350

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
100	Capay clay, 0 to 2 percent slopes	376	0.3
102	Alamo clay, 0 to 2 percent slopes	82	*
106	Archerdale very fine sandy loam, overwash, 0 to 2 percent slopes	375	0.3
107	Archerdale clay loam, 0 to 2 percent slopes	4,200	3.9
127	Chuloak sandy loam, 0 to 2 percent slopes	756	0.7
128	Cogna loam, 0 to 2 percent slopes, overwash	77	*
129	Cogna loam, 0 to 2 percent slopes	43	*
130	Columbia sandy loam, drained, 0 to 2 percent slopes, rarely flooded	940	0.9
131	Columbia sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded	132	0.1
134	Cometa sandy loam, 2 to 8 percent slopes	7,321	6.7
142	Delhi loamy sand, 0 to 2 percent slopes	211	0.2
151	Mine dredge tailings-Riverwash complex, 0 to 5 percent slopes	461	0.4
157	Exeter sandy clay loam, 0 to 2 percent slopes	2,013	1.8
158	Finrod clay, 0 to 2 percent slopes	292	0.3
170	Hicksville loam, 0 to 2 percent slopes, occasionally flooded	2,158	2.0
172	Hicksville gravelly loam, 0 to 2 percent slopes, occasionally flooded	547	0.5
174	Hollenbeck silty clay, 1 to 3 percent slopes	9	*
175	Honcut sandy loam, 0 to 2 percent slopes	2,052	1.9
176	Honcut fine sandy loam, 2 to 5 percent slopes	140	0.1
177	Honcut gravelly sandy loam, 0 to 2 percent slopes	254	0.2
183	Jahant loam, 2 to 8 percent slopes	3	*
187	Keyes-Bellota complex, 2 to 15 percent slopes	11	*
188	Keyes-Redding complex, 2 to 8 percent slopes	19	*
193	Madera sandy loam, 0 to 2 percent slopes	435	0.4
195	Clear Lake clay, partially drained, 0 to 2 percent slopes	402	0.4
201	Nord loam, 0 to 2 percent slopes	367	0.3
202	Pardee gravelly loam, 0 to 3 percent slopes	243	0.2
206	Pentz fine sandy loam, 2 to 15 percent slopes	682	0.6
207	Pentz fine sandy loam, 15 to 50 percent slopes	1,361	1.2
209	Pentz-Bellota complex, 2 to 15 percent slopes	66	*
210	Pentz-Redding complex, 2 to 15 percent slopes	417	0.4
212	Peters clay, 2 to 8 percent slopes	756	0.7
219	Redding loam, 0 to 3 percent slopes	33	*
220	Redding gravelly loam, 2 to 8 percent slopes	3,425	3.1
221	Redding gravelly loam, 8 to 30 percent slopes	211	0.2
236	San Joaquin sandy loam, 0 to 2 percent slopes	2,975	2.7
237	San Joaquin sandy loam, 2 to 5 percent slopes	4,856	4.5
241	San Joaquin complex, 0 to 1 percent slopes	100	*
266	Veritas fine sandy loam, 0 to 2 percent slopes	216	0.2
285	Peters clay, 0 to 2 percent slopes	313	0.3
301	Archerdale-Hicksville association, 0 to 2 percent slopes	2,353	2.2
401	Peters-Pentz association, 2 to 8 percent slopes	7,057	6.5
451	Pentz-Peters association, 2 to 15 percent slopes	27,733	25.4
452	Pentz-Peters-Cometa association, 2 to 15 percent slopes	750	0.7
475	Pentz-Peters association, 2 to 50 percent slopes	11,900	10.9
551	Amador sandy loam, 5 to 15 percent slopes	6,893	6.3
575	Amador loam, 8 to 30 percent slopes	4,532	4.2
751	Auburn silt loam, 5 to 15 percent slopes	2,402	2.2
775	Auburn silt loam, 15 to 50 percent slopes	3,009	2.8
851	Mckeonhills clay, 5 to 15 percent slopes	834	0.8
999	Water	2,231	2.0
	Total	109,024	100.0

* Less than 0.1 percent.

Table 5.--Land Capability Classification

[Entries in the "N" column are for nonirrigated areas. Those in the "I" column are for irrigated areas]

Map symbol and soil name	Land capability N	Land capability I
100:		
Capay clay	4s	2s
102:		
Alamo clay	4w	3w
106:		
Archerdale, overwash	4s	2s
107:		
Archerdale clay loam	4s	2s
127:		
Chuloak sandy loam	4c	1
128:		
Cogna loam	4c-1	1
129:		
Cogna loam	4c-1	1
130:		
Columbia, rarely flooded	4s	2s
131:		
Columbia, occasionally flooded	4w	2w
134:		
Cometa sandy loam	4e	4e
142:		
Delhi loamy sand	4e	3s
151:		
Mine dredge tailings	8s	---
Riverwash	8w	---
157:		
Exeter sandy clay loam	4s	3s
158:		
Finrod clay	4s	2s
170:		
Hicksville loam	4w	2w
172:		
Hicksville gravelly loam	4w	2w
174:		
Hollenbeck silty clay	4e-5	2e-5
175:		
Honcut sandy loam	4c	1

Table 5.--Land Capability Classification --Continued

Map symbol and soil name	Land capability N	Land capability I
176:		
Honcut fine sandy loam	4s	2s
177:		
Honcut gravelly sandy loam	4s	2s
183:		
Jahant loam	4e-3	3e-3
187:		
Keyes gravelly loam	7e	7e
Bellota sandy loam	4e-3	3e-3
188:		
Keyes gravelly loam	7e	7e
Redding gravelly loam	4e-3	4e-3
193:		
Madera sandy loam	4s	4s
195:		
Clear Lake clay	4w	2w
201:		
Nord loam	4c	1
202:		
Pardee gravelly loam	6s	4s
206:		
Pentz fine sandy loam	6e	4e
207:		
Pentz fine sandy loam	6e	4e
209:		
Pentz loam	7e	7e
Bellota loam	4e-8	3e-8
210:		
Pentz loam	6e	4e
Redding gravelly loam	4e	4e
212:		
Peters clay	4e	4e
219:		
Redding loam	4s	3s
220:		
Redding gravelly loam	4e	4e
221:		
Redding gravelly loam	4e	4e
236:		
San Joaquin sandy loam	4s	4s

Table 5.--Land Capability Classification --Continued

Map symbol and soil name	Land capability N	Land capability I
237:		
San Joaquin sandy loam	4e	4e
241:		
San Joaquin sandy loam	4s	4s
San Joaquin, thick surface	4s	3s
266:		
Veritas fine sandy loam	4s	2s
285:		
Peters clay	4s	4s
301:		
Archerdale clay loam	4s	2s
Hicksville silt loam	4w	2w
401:		
Peters silty clay loam	4e	4e
Pentz loam	6e	4e
451:		
Pentz silt loam	6e	4e
Peters silty clay loam	4e	4e
452:		
Pentz silt loam	6e	4e
Peters silty clay loam	4e	4e
Cometa sandy loam	4e	4e
475:		
Pentz silt loam	6e	4e
Peters silty clay loam	4e	4e
551:		
Amador loam	6e	4e
575:		
Amador loam	6e	4e
751:		
Auburn silt loam	6e	4e
775:		
Auburn silt loam	6e	4e
851:		
Mckeonhills clay	3e	2e
999:		
Water.		

Table 6.--Prime Farmland

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name]

Map symbol	Soil name
100	Capay clay, 0 to 2 percent slopes (where irrigated)
106	Archerdale very fine sandy loam, overwash, 0 to 2 percent slopes (where irrigated)
107	Archerdale clay loam, 0 to 2 percent slopes (where irrigated)
127	Chuloak sandy loam, 0 to 2 percent slopes (where irrigated)
128	Cogna loam, 0 to 2 percent slopes, overwash (where irrigated)
129	Cogna loam, 0 to 2 percent slopes (where irrigated)
130	Columbia sandy loam, drained, 0 to 2 percent slopes, rarely flooded (where irrigated)
131	Columbia sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded (where irrigated)
158	Finrod clay, 0 to 2 percent slopes (where irrigated)
170	Hicksville loam, 0 to 2 percent slopes, occasionally flooded (where irrigated)
172	Hicksville gravelly loam, 0 to 2 percent slopes, occasionally flooded (where irrigated)
174	Hollenbeck silty clay, 1 to 3 percent slopes (where irrigated)
175	Honcut sandy loam, 0 to 2 percent slopes (where irrigated)
176	Honcut fine sandy loam, 2 to 5 percent slopes (where irrigated)
177	Honcut gravelly sandy loam, 0 to 2 percent slopes (where irrigated)
183	Jahant loam, 2 to 8 percent slopes (where irrigated)
195	Clear Lake clay, partially drained, 0 to 2 percent slopes (where irrigated and drained)
201	Nord loam, 0 to 2 percent slopes (where irrigated)
266	Veritas fine sandy loam, 0 to 2 percent slopes (where irrigated)

Table 7.--Storie Index

[The California Storie Index expresses numerically the relative degree of suitability of a soil for general intensive agricultural uses at the time of evaluation. The rating is based only on soil characteristics and is obtained by evaluating such factors as soil depth, texture of the surface soil, subsoil characteristics, and surface relief]

Map symbol and soil name	Storie index rating	Storie grade
100:		
Capay clay	41	Grade three: Fair
102:		
Alamo clay	9	Grade six: Nonagricultural
106:		
Archerdale, overwash	84	Grade one: Excellent
107:		
Archerdale clay loam	76	Grade two: Good
127:		
Chuloak sandy loam	73	Grade two: Good
128:		
Cogna loam	83	Grade one: Excellent
129:		
Cogna loam	83	Grade one: Excellent
130:		
Columbia, rarely flooded	65	Grade two: Good
131:		
Columbia, occasionally flooded	65	Grade two: Good
134:		
Cometa sandy loam	44	Grade three: Fair
142:		
Delhi loamy sand	67	Grade two: Good
151:		
Mine dredge tailings	---	Not rated
Riverwash	---	Not rated
157:		
Exeter sandy clay loam	30	Grade four: Poor
158:		
Finrod clay	41	Grade three: Fair
170:		
Hicksville loam	52	Grade three: Fair
172:		
Hicksville gravelly loam	52	Grade three: Fair
174:		
Hollenbeck silty clay	40	Grade three: Fair
175:		
Honcut sandy loam	73	Grade two: Good

Table 7.--Storie Index--Continued

Map symbol and soil name	Storie index rating	Storie grade
176:		
Honcut fine sandy loam	73	Grade two: Good
177:		
Honcut gravelly sandy loam	52	Grade three: Fair
183:		
Jahant loam	52	Grade three: Fair
187:		
Bellota sandy loam	32	Grade four: Poor
Keyes gravelly loam	16	Grade five: Very poor
188:		
Keyes gravelly loam	16	Grade five: Very poor
Redding gravelly loam	14	Grade five: Very poor
193:		
Madera sandy loam	25	Grade four: Poor
195:		
Clear Lake clay	24	Grade four: Poor
201:		
Nord loam	83	Grade one: Excellent
202:		
Pardee gravelly loam	16	Grade five: Very poor
206:		
Pentz fine sandy loam	24	Grade four: Poor
207:		
Pentz fine sandy loam	17	Grade five: Very poor
209:		
Bellota loam	58	Grade three: Fair
Pentz loam	28	Grade four: Poor
210:		
Pentz loam	24	Grade four: Poor
Redding gravelly loam	14	Grade five: Very poor
212:		
Peters clay	17	Grade five: Very poor
219:		
Redding loam	20	Grade five: Very poor
220:		
Redding gravelly loam	13	Grade five: Very poor
221:		
Redding gravelly loam	13	Grade five: Very poor
236:		
San Joaquin sandy loam	25	Grade four: Poor
237:		
San Joaquin sandy loam	24	Grade four: Poor

Table 7.--Storie Index--Continued

Map symbol and soil name	Storie index rating	Storie grade
241:		
San Joaquin sandy loam	27	Grade four: Poor
San Joaquin, thick surface	25	Grade four: Poor
266:		
Veritas fine sandy loam	82	Grade one: Excellent
285:		
Peters clay	17	Grade five: Very poor
301:		
Archerdale clay loam	76	Grade two: Good
Hicksville silt loam	52	Grade three: Fair
401:		
Pentz loam	23	Grade four: Poor
Peters silty clay loam	30	Grade four: Poor
451:		
Pentz silt loam	19	Grade five: Very poor
Peters silty clay loam	28	Grade four: Poor
452:		
Cometa sandy loam	60	Grade two: Good
Pentz silt loam	23	Grade four: Poor
Peters silty clay loam	29	Grade four: Poor
475:		
Pentz silt loam	17	Grade five: Very poor
Peters silty clay loam	28	Grade four: Poor
551:		
Amador loam	6	Grade six: Nonagricultural
575:		
Amador loam	6	Grade six: Nonagricultural
751:		
Auburn silt loam	28	Grade four: Poor
775:		
Auburn silt loam	24	Grade four: Poor
851:		
Mckeonhills clay	22	Grade four: Poor
999:		
Water.		

Table 8a.--Recreational Development (Part 1)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA Office. The i
the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the va
from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating is based on the
highest value. Only the three highest value limitations are listed. There may be more limitations. Fine-e
coarse fragments are reported on a weight basis. An explanation of the rating criteria and of the abbreviat
describing the limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
100:						
Capay clay-------------	90	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Ponded (any duration)	1.00	Ponded (any
		Ponded (any duration)	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Surface clay ≥ 40%	1.00	Permeability of .06-.6"/hr	0.46	Permeabilit
102:						
Alamo clay-------------	90	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Ponded (any duration)	1.00	Ponded (any
		Ponded (any duration)	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Surface clay ≥ 40%	1.00	Permeability < .06"/hr	1.00	Permeabilit
106:						
Archerdale, overwash---	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Dusty	0.50	Dusty
		Dusty	0.50	Permeability of .06-.6"/hr	0.46	Permeabilit
		Permeability of .06-.6"/hr	0.46			
107:						
Archerdale clay loam---	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Permeability of .06-.6"/hr	0.46	Permeabilit
		Permeability of .06-.6"/hr	0.46			
127:						
Chuloak sandy loam-----	85	Limitations		No limitations		Limitations
		Flooding ≥ rare	1.00			Surface fra 10-25%
128:						
Cogna loam-------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Dusty	0.50	Dusty
		Dusty	0.50			
129:						
Cogna loam-------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Dusty	0.50	Dusty
		Dusty	0.50			

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
130:						
Columbia, rarely flooded---------------	85	Limitations		No limitations		No limitation
		Flooding ≥ rare	1.00			
131:						
Columbia, occasionally flooded---------------	85	Limitations		No limitations		Limitations
		Flooding ≥ rare	1.00			Occasional
134:						
Cometa sandy loam------	85	Limitations		Limitations		Limitations
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Slopes 2 to
						Permeabilit
						Surface fra
						10-25%
142:						
Delhi loamy sand-------	85	Limitations		Limitations		Limitations
		Surface sand fractions 70-90% by wt.	0.76	Surface sand fractions 70-90% by wt.	0.76	Surface san 70-90% by
151:						
Mine dredge tailings---	45	Not rated		Not rated		Not rated
Riverwash--------------	35	Not rated		Not rated		Not rated
157:						
Exeter sandy clay loam-	85	Limitations		Limitations		Limitations
		Depth to pan 20-40”	0.42	Depth to pan 20-40”	0.42	Surface fra 10-25%
158:						
Finrod clay------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Surface clay ≥ 40%	1.00	Permeability of .06-.6"/hr	0.46	Permeabilit
		Permeability of .06-.6"/hr	0.46			
170:						
Hicksville loam--------	85	Limitations		Limitations		Limitations
		Fragments (<3") 25-50%	0.54	Fragments (<3") 25-50%	0.54	Surface fra >25%
		Dusty	0.50	Dusty	0.50	Dusty

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
172:						
Hicksville gravelly loam------------------	85	Limitations		Limitations		Limitations
		Fragments (<3") 25-50%	0.54	Fragments (<3") 25-50%	0.54	Surface fra
		Dusty	0.50	Dusty	0.50	>25%
						Dusty
174:						
Hollenbeck silty clay--	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Surface clay ≥ 40%	1.00	Permeability of .06-.6"/hr	0.50	Permeabilit
		Permeability of .06-.6"/hr	0.50			Slopes 2 to
175:						
Honcut sandy loam------	85	Limitations		No limitations		Limitations
		Flooding ≥ rare	1.00			Surface fra
						10-25%
176:						
Honcut fine sandy loam-	85	Limitations		No limitations		Limitations
		Flooding ≥ rare	1.00			Surface fra
						10-25%
						Slopes 2 to
177:						
Honcut gravelly sandy loam------------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Fragments (<3") 25-50%	0.16	Surface fra
		Fragments (<3") 25-50%	0.16			>25%
183:						
Jahant loam------------	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Slopes 2 to
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Surface fra
						10-25%
						Dusty
187:						
Keyes gravelly loam----	45	Limitations		Limitations		Limitations
		Depth to pan ≤ 20”	1.00	Depth to pan ≤ 20”	1.00	Surface fra
		Dusty	0.50	Dusty	0.50	>25%
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Slopes 2 to
						Dusty

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
187:						
Bellota sandy loam-----	40	Limitations		Limitations		Limitations
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Slopes 2 to
		Depth to pan 20-40″	0.10	Depth to pan 20-40″	0.10	Surface fra
						10-25%
						Permeabilit
188:						
Keyes gravelly loam----	45	Limitations		Limitations		Limitations
		Depth to pan ≤ 20″	1.00	Depth to pan ≤ 20″	1.00	Surface fra
		Dusty	0.50	Dusty	0.50	>25%
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Slopes 2 to
						Dusty
Redding gravelly loam--	40	Limitations		Limitations		Limitations
		Depth to pan 20-40″	0.97	Depth to pan 20-40″	0.97	Surface fra
		Fragments (<3") 25-50%	0.56	Fragments (<3") 25-50%	0.56	>25%
		Dusty	0.50	Dusty	0.50	Slopes 2 to
						Dusty
193:						
Madera sandy loam------	85	Limitations		Limitations		Limitations
		Depth to pan 20-40″	0.90	Depth to pan 20-40″	0.90	Permeabilit
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	
195:						
Clear Lake clay--------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Ponded (any duration)	1.00	Ponded (any
		Ponded (any duration)	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Surface clay ≥ 40%	1.00	Permeability of .06-.6"/hr	0.46	Permeabilit
201:						
Nord loam--------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Dusty	0.50	Dusty
		Dusty	0.50			
202:						
Pardee gravelly loam---	85	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Surface fra
		Fragments (<3") 25-50%	0.69	Fragments (<3") 25-50%	0.69	>25%
		Dusty	0.50	Dusty	0.50	Bedrock dep
						Dusty

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Limitation	Camp areas: Value	Picnic areas: Limitation	Picnic areas: Value	P...: Limi...
206:						
Pentz fine sandy loam--	85	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
						Slopes 2 to
						Surface fra
						10-25%
207:						
Pentz fine sandy loam--	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes > 6%
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Surface sand fractions 70-90% by wt.	0.01	Surface sand fractions 70-90% by wt.	0.01	Surface fra 10-25%
209:						
Pentz loam-------------	55	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Slopes > 6%
		Dusty	0.50	Dusty	0.50	Bedrock dep
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Surface fra 10-25%
Bellota loam-----------	30	Limitations		Limitations		Limitations
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Slopes 2 to
		Depth to pan 20-40"	0.10	Depth to pan 20-40"	0.10	Surface fra 10-25%
						Permeabilit
210:						
Pentz loam-------------	55	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Slopes > 6%
		Dusty	0.50	Dusty	0.50	Bedrock dep
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Surface fra 10-25%
Redding gravelly loam--	25	Limitations		Limitations		Limitations
		Depth to pan 20-40"	0.97	Depth to pan 20-40"	0.97	Surface fra >25%
		Fragments (<3") 25-50%	0.84	Fragments (<3") 25-50%	0.84	Dusty
		Dusty	0.50	Dusty	0.50	Permeabilit
212:						
Peters clay------------	85	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Permeability of .06-.6"/hr	0.46	Permeability of .06-.6"/hr	0.46	Slopes 2 to

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
219:						
Redding loam----------	85	Limitations		Limitations		Limitations
		Fragments (<3") 25-50%	0.84	Fragments (<3") 25-50%	0.84	Surface fra
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	>25%
		Dusty	0.50	Dusty	0.50	Permeabilit
						Dusty
220:						
Redding gravelly loam--	85	Limitations		Limitations		Limitations
		Depth to pan 20-40”	0.97	Depth to pan 20-40”	0.97	Surface fra
		Fragments (<3") 25-50%	0.95	Fragments (<3") 25-50%	0.95	>25%
		Dusty	0.50	Dusty	0.50	Slopes 2 to
						Dusty
221:						
Redding gravelly loam--	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes > 6%
		Depth to pan 20-40”	0.97	Depth to pan 20-40”	0.97	Surface fra
		Dusty	0.50	Dusty	0.50	>25%
						Dusty
236:						
San Joaquin sandy loam-	85	Limitations		Limitations		Limitations
		Depth to pan 20-40”	0.90	Depth to pan 20-40”	0.90	Permeabilit
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	
237:						
San Joaquin sandy loam-	85	Limitations		Limitations		Limitations
		Depth to pan 20-40”	0.90	Depth to pan 20-40”	0.90	Slopes 2 to
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Permeabilit
241:						
San Joaquin sandy loam-	45	Limitations		Limitations		Limitations
		Depth to pan 20-40”	0.90	Depth to pan 20-40”	0.90	Dusty
		Dusty	0.50	Dusty	0.50	Permeabilit
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	
San Joaquin, thick surface---------------	40	Limitations		Limitations		No limitation
		Depth to pan 20-40”	0.90	Depth to pan 20-40”	0.90	
266:						
Veritas fine sandy loam------------------	85	Limitations		No limitations		No limitation
		Flooding ≥ rare	1.00			

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
285:						
Peters clay------------	85	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Permeability of .06-.6"/hr	0.46	Permeability of .06-.6"/hr	0.46	Permeabilit
301:						
Archerdale clay loam---	65	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Permeability of .06-.6"/hr	0.46	Permeabilit
		Permeability of .06-.6"/hr	0.46			
Hicksville silt loam---	20	Limitations		Limitations		Limitations
		Fragments (<3") 25-50%	0.54	Fragments (<3") 25-50%	0.54	Surface fra >25%
		Dusty	0.50	Dusty	0.50	Dusty
401:						
Peters silty clay loam-	60	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Permeability of .06-.6"/hr	0.46	Permeability of .06-.6"/hr	0.46	Permeabilit
						Slopes 2 to
Pentz loam-------------	25	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Dusty	0.50	Dusty	0.50	Slopes 2 to
						Surface fra 10-25%
451:						
Pentz silt loam--------	65	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Slopes > 6%
		Dusty	0.50	Dusty	0.50	Bedrock dep
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Surface fra 10-25%
Peters silty clay loam-	35	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Permeability of .06-.6"/hr	0.46	Permeability of .06-.6"/hr	0.46	Permeabilit
						Slopes 2 to
452:						
Pentz silt loam--------	45	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Slopes > 6%
		Dusty	0.50	Dusty	0.50	Bedrock dep
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Surface fra 10-25%

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
452:						
Peters silty clay loam-	25	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Permeability of .06-.6"/hr	0.46	Permeability of .06-.6"/hr	0.46	Slopes 2 to
						Permeabilit
Cometa sandy loam------	15	Limitations		Limitations		Limitations
		Permeability of .06-.6"/hr	0.50	Permeability of .06-.6"/hr	0.50	Slopes 2 to
						Permeabilit
						Surface fra 10-25%
475:						
Pentz silt loam--------	60	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes > 6%
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Dusty	0.50	Dusty	0.50	Dusty
Peters silty clay loam-	25	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Permeability of .06-.6"/hr	0.46	Permeability of .06-.6"/hr	0.46	Permeabilit
						Slopes 2 to
551:						
Amador loam------------	85	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Slopes > 6%
		Dusty	0.50	Dusty	0.50	Bedrock dep
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Surface fra 10-25%
575:						
Amador loam------------	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes > 6%
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Dusty	0.50	Dusty	0.50	Dusty
751:						
Auburn silt loam-------	85	Limitations		Limitations		Limitations
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Slopes > 6%
		Dusty	0.50	Dusty	0.50	Bedrock dep
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Dusty
775:						
Auburn silt loam-------	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes > 6%
		Bedrock depth < 20"	1.00	Bedrock depth < 20"	1.00	Bedrock dep
		Dusty	0.50	Dusty	0.50	Dusty

Table 8a.--Recreational Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		P
		Limitation	Value	Limitation	Value	Limi
851:						
Mckeonhills clay-------	85	Limitations		Limitations		Limitations
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Surface cla
		Permeability of .06-.6"/hr	0.48	Permeability of .06-.6"/hr	0.48	Slopes > 6%
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Permeabilit
999:						
Water------------------	100	Not rated		Not rated		Not rated

The interpretation for *camp areas* evaluates the following soil properties at varying depths in the soil: flo wetness; slope; depth to bedrock; depth to a cemented pan; fragments less than, equal to, or greater than 3 inche content (SAR); salinity (EC); a clayey surface layer; Unified classes for a high content of organic matter (PT, O dustiness; and permeability (Ksat) that is too rapid, allowing seepage in some climates.

The interpretation for *picnic areas* evaluates the following soil properties at varying depths in the soil: f wetness, slope, depth to bedrock, depth to a cemented pan, salinity (EC), pH, soil dustiness, fragments greater t surface rock fragments greater than 10 inches in size, the content of sand or clay in the surface layer, Unified content of organic matter (PT, OL, and OH), and permeability (Ksat) that is too rapid, allowing seepage in some c

The interpretation for *playgrounds* evaluates the following soil properties at varying depths in the soil: fl wetness, slope, depth to bedrock, depth to a cemented pan, surface rock fragments greater than 10 inches in size, or less than 3 inches in size, Unified class for high content of organic matter (PT, OL, and OH), soil dustiness, in the surface layer, pH, salinity (EC), and permeability that is too rapid, allowing seepage in some climates.

Table 8b.--Recreational Development (Part 2)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA Office. indicates the dominant soil condition but does not eliminate the need for onsite investigation. The nu columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rati limitation with the highest value. Only the three highest value limitations are listed. There may be Fine-earth fractions and coarse fragments are reported on a weight basis. An explanation of the rating abbreviations used in describing the limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Gol
		Limitation	Value	Limitation	Value	Limit
100:						
Capay clay---------------	90	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Ponded (any duration)	1.00	Ponded (any
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Clay in surf
102:						
Alamo clay---------------	90	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Ponded (any duration)	1.00	Ponded (any
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Clay in surf
						Depth to par
106:						
Archerdale, overwash-----	85	Limitations		Limitations		No Limitations
		Dusty	0.50	Dusty	0.50	
107:						
Archerdale clay loam-----	85	No limitations		No limitations		No Limitations
127:						
Chuloak sandy loam-------	85	No limitations		No limitations		No Limitations
128:						
Cogna loam---------------	85	Limitations		Limitations		No Limitations
		Dusty	0.50	Dusty	0.50	
129:						
Cogna loam---------------	85	Limitations		Limitations		No Limitations
		Dusty	0.50	Dusty	0.50	
130:						
Columbia, rarely flooded-	85	No limitations		No limitations		No Limitations
131:						
Columbia, occasionally flooded----------------	85	No limitations		No limitations		Limitations
						Occasional f
134:						
Cometa sandy loam--------	85	No limitations		No limitations		Limitations
						AWC 2-4" to

Table 8b.--Recreational Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Gol...
		Limitation	Value	Limitation	Value	Limit...
142:						
Delhi loamy sand---------	85	Limitations		Limitations		Limitations
		Surface sand fractions 70-90% by wt.	0.76	Surface sand fractions 70-90% by wt.	0.76	AWC 2-4" to
151:						
Mine dredge tailings-----	45	Not rated		Not rated		Not rated
Riverwash----------------	35	Not rated		Not rated		Not rated
157:						
Exeter sandy clay loam---	85	No limitations		No limitations		Limitations
						Depth to par
158:						
Finrod clay--------------	85	Limitations		Limitations		Limitations
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Clay in surf
170:						
Hicksville loam----------	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Fragments (g 25-50%
172:						
Hicksville gravelly loam--------------------	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Fragments (g 25-50%
174:						
Hollenbeck silty clay----	85	Limitations		Limitations		Limitations
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Clay in surf
175:						
Honcut sandy loam--------	85	No limitations		No limitations		No Limitations
176:						
Honcut fine sandy loam---	85	No limitations		No limitations		No Limitations
177:						
Honcut gravelly sandy loam--------------------	85	No limitations		No limitations		Limitations
						Fragments (g 25-50%
						AWC 2-4" to

Table 8b.--Recreational Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Gol
		Limitation	Value	Limitation	Value	Limit
183:						
Jahant loam	85	Limitations Dusty	 0.50	Limitations Dusty	 0.50	No Limitations
187:						
Keyes gravelly loam	45	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations Depth to par AWC < 2" to Bedrock dept
Bellota sandy loam	40	No limitations		No limitations		Limitations AWC 2-4" to Depth to par Bedrock dept
188:						
Keyes gravelly loam	45	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations Depth to par AWC < 2" to Bedrock dept
Redding gravelly loam	40	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations AWC < 2" to Depth to par Fragments (g 25-50%
193:						
Madera sandy loam	85	No limitations		No limitations		Limitations Depth to par AWC 2-4" to
195:						
Clear Lake clay	85	Limitations Ponded (any duration) Surface clay ≥ 40%	 1.00 1.00	Limitations Ponded (any duration) Surface clay ≥ 40%	 1.00 1.00	Limitations Ponded (any Clay in surf
201:						
Nord loam	85	Limitations Dusty	 0.50	Limitations Dusty	 0.50	No Limitations
202:						
Pardee gravelly loam	85	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations AWC < 2" to Bedrock dept Fragments (g 25-50%

Table 8b.--Recreational Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Gol
		Limitation	Value	Limitation	Value	Limit
206:						
Pentz fine sandy loam----	85	No limitations		No limitations		Limitations AWC < 2" to Bedrock dept
207:						
Pentz fine sandy loam----	85	Limitations Slopes > 25% Surface sand fractions 70-90% by wt.	 1.00 0.01	Limitations Slopes 25 to 40% Surface sand fractions 70-90% by wt.	 0.56 0.01	Limitations Slopes > 15% AWC < 2" to Bedrock dept
209:						
Pentz loam---------------	55	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations AWC < 2" to Bedrock dept Slopes 8 to
Bellota loam-------------	30	No limitations		No limitations		Limitations AWC 2-4" to Depth to par Bedrock dept
210:						
Pentz loam---------------	55	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations AWC < 2" to Bedrock dept Slopes 8 to
Redding gravelly loam----	25	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations Depth to par AWC 2-4" to Fragments (g 25-50%
212:						
Peters clay--------------	85	Limitations Surface clay ≥ 40%	 1.00	Limitations Surface clay ≥ 40%	 1.00	Limitations Bedrock dept Clay in surf AWC 2-4" to
219:						
Redding loam-------------	85	Limitations Dusty	 0.50	Limitations Dusty	 0.50	Limitations AWC 2-4" to Fragments (g 25-50% Depth to par

Table 8b.--Recreational Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Gol
		Limitation	Value	Limitation	Value	Limit
220:						
Redding gravelly loam----	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Depth to par
						AWC 2-4" to
						Fragments (g
						25-50%
221:						
Redding gravelly loam----	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Slopes > 15%
						AWC < 2" to
						Depth to par
236:						
San Joaquin sandy loam---	85	No limitations		No limitations		Limitations
						AWC < 2" to
						Depth to par
237:						
San Joaquin sandy loam---	85	No limitations		No limitations		Limitations
						AWC < 2" to
						Depth to par
241:						
San Joaquin sandy loam---	45	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	AWC < 2" to
						Depth to par
San Joaquin, thick surface-----------------	40	No limitations		No limitations		Limitations
						Depth to par
						AWC 2-4" to
266:						
Veritas fine sandy loam--	85	No limitations		No limitations		No Limitations
285:						
Peters clay-------------	85	Limitations		Limitations		Limitations
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Bedrock dept
						Clay in surf
						AWC < 2" to
301:						
Archerdale clay loam-----	65	No limitations		No limitations		No Limitations

Table 8b.--Recreational Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Limitation	Paths and trails: Value	Off-road motorcycle trails: Limitation	Off-road motorcycle trails: Value	Gol...: Limit...
301:						
Hicksville silt loam-----	20	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Fragments (g
						25-50%
401:						
Peters silty clay loam---	60	No limitations		No limitations		Limitations
						Bedrock dept
						AWC < 2" to
Pentz loam---------------	25	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	AWC < 2" to
						Bedrock dept
451:						
Pentz silt loam----------	65	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	AWC < 2" to
						Bedrock dept
						Slopes 8 to
Peters silty clay loam---	35	No limitations		No limitations		Limitations
						Bedrock dept
						AWC < 2" to
452:						
Pentz silt loam----------	45	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	AWC < 2" to
						Bedrock dept
						Slopes 8 to
Peters silty clay loam---	25	No limitations		No limitations		Limitations
						Bedrock dept
						AWC < 2" to
Cometa sandy loam--------	15	No limitations		No limitations		Limitations
						AWC 2-4" to
475:						
Pentz silt loam----------	60	Limitations		Limitations		Limitations
		Slopes > 25%	1.00	Dusty	0.50	Slopes > 15%
		Dusty	0.50	Slopes 25 to 40%	0.22	AWC < 2" to
						Bedrock dept
Peters silty clay loam---	25	No limitations		No limitations		Limitations
						Bedrock dept
						AWC < 2" to

Table 8b.--Recreational Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Limitation	Paths and trails: Value	Off-road motorcycle trails: Limitation	Off-road motorcycle trails: Value	Gol… Limit…
551:						
Amador loam	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Bedrock dept
						AWC 2-4" to
						Slopes 8 to
575:						
Amador loam	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Bedrock dept
						Slopes > 15%
						AWC 2-4" to
751:						
Auburn silt loam	85	Limitations		Limitations		Limitations
		Dusty	0.50	Dusty	0.50	Bedrock dept
						AWC < 2" to
						Fragments >3
775:						
Auburn silt loam	85	Limitations		Limitations		Limitations
		K-factor >.35 and slopes > 8%	1.00	Dusty	0.50	Slopes > 15%
		Slopes > 25%	1.00			Bedrock dept
		Dusty	0.50			AWC < 2" to
851:						
Mckeonhills clay	85	Limitations		Limitations		Limitations
		Surface clay ≥ 40%	1.00	Surface clay ≥ 40%	1.00	Clay in surf
						Slopes 8 to
999:						
Water	100	Not rated		Not rated		Not rated

The interpretation for *paths and trails* evaluates the following soil properties at varying depths in th ponding; wetness; slope; fragments less than, equal to, or greater than 3 inches in size; clay or sand conte surface rock fragments greater than or equal to 10 inches in size; Unified classes for a high content of org and OH); soil dustiness; and the hazard of water erosion.

The interpretation for *off-road motorcycle trails* evaluates the following soil properties at varying de flooding; ponding; wetness; slope; soil dustiness; fragments less than, equal to, or greater than 3 inches i content in the surface layer; and Unified classes for a high content of organic matter (PT, OL, and OH).

The interpretation for *lawns, landscaping, and golf fairways* evaluates the following soil properties at the soil: flooding; ponding; wetness; slope; depth to bedrock; depth to a cemented pan; fragments greater th than 3 inches in size; Unified class for a high content of organic matter (PT, OL, and OH); soil dustiness; in the surface layer; surface rock fragments greater than or equal to 10 inches in size; soil pH; salinity (SAR); calcium carbonates; and sulfur content.

Table 9a.--Building Site Development (Part 1)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA Office. The
indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbe
columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating
limitation with the highest value. Only the three highest value limitations are listed. There may be mor
earth fractions and coarse fragments are reported on a weight basis. An explanation of the rating criteri
abbreviations used in describing the limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
100:						
Capay clay---------------	90	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Ponded (any duration)	1.00	Ponded (a
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
102:						
Alamo clay---------------	90	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Ponded (any duration)	1.00	Ponded (a
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
106:						
Archerdale, overwash-----	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
107:						
Archerdale clay loam-----	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
127:						
Chuloak sandy loam-------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw
128:						
Cogna loam---------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
				Shrink-swell (LEP 3-6)	0.50	
129:						
Cogna loam---------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
				Shrink-swell (LEP 3-6)	0.50	

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
130:						
Columbia, rarely flooded-	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
131:						
Columbia, occasionally flooded-----------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
134:						
Cometa sandy loam--------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
						Slopes fr
142:						
Delhi loamy sand---------	85	No limitations		No limitations		No limitatio
151:						
Mine dredge tailings-----	45	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
Riverwash----------------	35	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
		Saturation < 18" depth	1.00	Saturation < 2.5' depth	1.00	Saturatio
157:						
Exeter sandy clay loam---	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw
158:						
Finrod, clay-------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
170:						
Hicksville loam----------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw
172:						
Hicksville gravelly loam--------------------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
174:						
Hollenbeck silty clay----	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
175:						
Honcut sandy loam--------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
176:						
Honcut fine sandy loam---	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
						Slopes fr
177:						
Honcut gravelly sandy loam--------------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
183:						
Jahant loam--------------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP > 6)	1.00	Shrink-sw
						Slopes fr
187:						
Keyes gravelly loam------	45	Limitations		Limitations		Limitations
		Thin pan ≤ 20"	1.00	Pan (thin) depth < 20"	1.00	Thin pan
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
				Bedrock (soft) 20-40"	0.15	Slopes fr
Bellota sandy loam-------	40	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw
				Pan (thin) from 20-40"	0.10	Slopes fr
				Bedrock (soft) 20-40"	0.03	
188:						
Keyes gravelly loam------	45	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
				Bedrock (soft) 20-40"	0.15	Slopes fr
Redding gravelly loam----	40	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
						Slopes fr
193:						
Madera sandy loam--------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
195:						
Clear Lake clay----------	85	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Ponded (any duration)	1.00	Ponded (a
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
201:						
Nord loam----------------	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding
202:						
Pardee gravelly loam-----	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
206:						
Pentz fine sandy loam----	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
						Slopes fr
207:						
Pentz fine sandy loam----	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Slopes > 15%	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Slopes > 15%	1.00	depth < 20"		Slopes >
209:						
Pentz loam---------------	55	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Slopes >
Bellota loam-------------	30	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw
				Pan (thin) from 20-40"	0.10	Slopes fr
				Bedrock (soft) 20-40”	0.03	
210:						
Pentz loam---------------	55	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Slopes >
Redding gravelly loam----	25	No limitations		No limitations		No limitati

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sm
		Limitation	Value	Limitation	Value	Li
212:						
Peters clay--------------	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Shrink-swell (LEP > 6)	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Shrink-swell (LEP > 6)	1.00	depth < 20"		Shrink-sw
						Slopes fr
219:						
Redding loam-------------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
220:						
Redding gravelly loam----	85	No limitations		No limitations		Limitations
						Slopes fr
221:						
Redding gravelly loam----	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Slopes >
		Slopes > 15%	1.00	Slopes > 15%	1.00	Shrink-sw
236:						
San Joaquin sandy loam---	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
237:						
San Joaquin sandy loam---	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
						Slopes fr
241:						
San Joaquin sandy loam---	45	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
San Joaquin, thick surface-----------------	40	No limitations		No limitations		No limitati
266:						
Veritas fine sandy loam--	85	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
285:						
Peters clay--------------	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Shrink-swell (LEP > 6)	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Shrink-swell (LEP > 6)	1.00	depth < 20"		Shrink-sw

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
301:						
Archerdale clay loam-----	65	Limitations		Limitations		Limitations
		Flooding ≥ rare	1.00	Flooding ≥ rare	1.00	Flooding ≥
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
Hicksville silt loam-----	20	Limitations		Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Shrink-swell (LEP 3-6)	0.50	Shrink-sw
401:						
Peters silty clay loam---	60	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Shrink-swell (LEP > 6)	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Shrink-swell (LEP > 6)	1.00	depth < 20"		Shrink-sw
Pentz loam---------------	25	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		Shrink-swell (LEP 3-6)	0.01	depth < 20"		Slopes fr
						Shrink-sw
451:						
Pentz silt loam----------	65	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
		Shrink-swell (LEP 3-6)	0.02	Shrink-swell (LEP 3-6)	0.02	Slopes >
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Shrink-sw
Peters silty clay loam---	35	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Shrink-swell (LEP > 6)	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Shrink-swell (LEP > 6)	1.00	depth < 20"		Shrink-sw
452:						
Pentz silt loam----------	45	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
		Shrink-swell (LEP 3-6)	0.01	Slopes 8 to 15%	0.01	Slopes >
		Slopes 8 to 15%	0.01			Shrink-sw
Peters silty clay loam---	25	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Shrink-swell (LEP > 6)	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Shrink-swell (LEP > 6)	1.00	depth < 20"		Shrink-sw
						Slopes fr

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
452:						
Cometa sandy loam--------	15	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
						Slopes fr
475:						
Pentz silt loam----------	60	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Slopes > 15%	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Slopes > 15%	1.00	depth < 20"		Slopes >
		Shrink-swell (LEP 3-6)	0.01			Shrink-sw
Peters silty clay loam---	25	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Shrink-swell (LEP > 6)	1.00	Bedrock (
		depth < 20"		Bedrock (soft)	1.00	depth <
		Shrink-swell (LEP > 6)	1.00	depth < 20"		Shrink-sw
551:						
Amador loam--------------	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Slopes >
575:						
Amador loam--------------	85	Limitations		Limitations		Limitations
		Bedrock (soft)	1.00	Bedrock (soft)	1.00	Bedrock (
		depth < 20"		depth < 20"		depth <
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes >
751:						
Auburn silt loam---------	85	Limitations		Limitations		Limitations
		Bedrock (hard)	1.00	Bedrock (hard)	1.00	Bedrock (
		depth < 20"		depth < 40"		depth <
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Slopes >
775:						
Auburn silt loam---------	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Slopes >
		Bedrock (hard)	1.00	Bedrock (hard)	1.00	Bedrock (
		depth < 20"		depth < 40"		depth <
851:						
Mckeonhills clay---------	85	Limitations		Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Shrink-swell (LEP > 6)	1.00	Shrink-sw
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Slopes >

Table 9a.--Building Site Development (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Sma
		Limitation	Value	Limitation	Value	Li
999:						
Water	100	Not rated		Not rated		Not rated

The interpretation for *dwellings without basements* evaluates the following soil properties, some at varying flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear exte (LEP), organic Unified classes for low soil strength (PT, OL, or OH), depth to hard or soft bedrock, depth to a cemented pan, and rock fragments greater than 3 inches in size.

The interpretation for *dwellings with basements* evaluates the following soil properties, some at varying d flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear exte (LEP), organic Unified classes for low strength (PT, OL, or OH), depth to hard or soft bedrock, depth to a thic pan, and rock fragments greater than 3 inches in size.

The interpretation for *small commercial buildings* evaluates the following soil properties, some at varying flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear exte (LEP), depth to hard or soft bedrock, depth to a thick or thin cemented pan, and fragments greater than 3 inche

Table 9b.--Building Site Development (Part 2)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA O
information indicates the dominant soil condition but does not eliminate the need for onsite in
numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the po
The rating is based on the limitation with the highest value. Only the three highest value lim
There may be more limitations. Fine-earth fractions and coarse fragments are reported on a wei
explanation of the rating criteria and of the abbreviations used in describing the limitations
of the table]

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow e
		Limitation	Value	Limitat
100:				
Capay clay--------------------	90	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Ponded (any durati
		Ponded (any duration)	1.00	Caving potential
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
102:				
Alamo clay--------------------	90	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Ponded (any durati
		Ponded (any duration)	1.00	Clay from 40 to 60
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
106:				
Archerdale, overwash----------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Clay from 40 to 60
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
		Rare flooding	0.50	
107:				
Archerdale clay loam----------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
		Rare flooding	0.50	
127:				
Chuloak sandy loam------------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Low caving potenti
		Rare flooding	0.50	
128:				
Cogna loam--------------------	85	Limitations		Limitations
		Rare flooding	0.50	Low caving potenti
129:				
Cogna loam--------------------	85	Limitations		Limitations
		Rare flooding	0.50	Low caving potenti

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Local roads and streets: Value	Shallow e…: Limitat…
130:				
Columbia, rarely flooded------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Caving potential
		Rare flooding	0.50	
131:				
Columbia, occasionally flooded---------------------	85	Limitations		Limitations
		Flooding ≥ occasional	1.00	Caving potential
		AASHTO GIN >8 (low soil strength)	1.00	Frequent or occasi
134:				
Cometa sandy loam-------------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	
142:				
Delhi loamy sand--------------	85	No limitations		Limitations
				Caving potential
151:				
Mine dredge tailings----------	45	Limitations		Limitations
		Flooding ≥ occasional	1.00	Frequent or occasi
				Low caving potenti
Riverwash---------------------	35	Limitations		Limitations
		Flooding ≥ occasional	1.00	Saturation < 2.5'
		Saturation < 12" depth	0.99	Caving potential
				Frequent or occasi
157:				
Exeter sandy clay loam--------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Low caving potenti
158:				
Finrod clay-------------------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Clay from 40 to 60
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
		Rare flooding	0.50	
170:				
Hicksville loam---------------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Caving potential
172:				
Hicksville gravelly loam------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Caving potential

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow e[xcavations]: Limitat[ion]
174:				
Hollenbeck silty clay---------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Caving potential
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
		Rare flooding	0.50	
175:				
Honcut sandy loam-------------	85	Limitations		Limitations
		Rare flooding	0.50	Low caving potenti
176:				
Honcut fine sandy loam--------	85	Limitations		Limitations
		Rare flooding	0.50	Low caving potenti
177:				
Honcut gravelly sandy loam----	85	Limitations		Limitations
		Rare flooding	0.50	Caving potential
183:				
Jahant loam-------------------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Clay from 40 to 60
		AASHTO GIN 5-8 (soil strength)	0.22	Low caving potenti
187:				
Keyes gravelly loam-----------	45	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Pan (thin) depth <
		Thin pan ≤ 20"	1.00	Bedrock (soft) fro
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
Bellota sandy loam------------	40	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Clay from 40 to 60
				Low caving potenti
				Pan (thin) from 20
188:				
Keyes gravelly loam-----------	45	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) fro
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
Redding gravelly loam---------	40	Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
193:				
Madera sandy loam-------------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Clay from 40 to 60
				Low caving potenti

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow e...: Limitat...
195:				
Clear Lake clay	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Ponded (any durati
		Ponded (any duration)	1.00	Caving potential
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
201:				
Nord loam	85	Limitations		Limitations
		Rare flooding	0.50	Low caving potenti
202:				
Pardee gravelly loam	85	Limitations		Limitations
		Bedrock (soft) depth < 20″	1.00	Bedrock (soft) dep
				Low caving potenti
206:				
Pentz fine sandy loam	85	Limitations		Limitations
		Bedrock (soft) depth < 20″	1.00	Bedrock (soft) dep
				Low caving potenti
207:				
Pentz fine sandy loam	85	Limitations		Limitations
		Slopes > 15%	1.00	Bedrock (soft) dep
		Bedrock (soft) depth < 20″	1.00	Slopes > 15%
				Low caving potenti
209:				
Pentz loam	55	Limitations		Limitations
		Bedrock (soft) depth < 20″	1.00	Bedrock (soft) dep
		Slopes 8 to 15%	0.01	Low caving potenti
				Slopes 8 to 15%
Bellota loam	30	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Clay from 40 to 60
				Low caving potenti
				Pan (thin) from 20
210:				
Pentz loam	55	Limitations		Limitations
		Bedrock (soft) depth < 20″	1.00	Bedrock (soft) dep
		Slopes 8 to 15%	0.01	Low caving potenti
				Slopes 8 to 15%
Redding gravelly loam	25	No limitations		Limitations
				Clay from 40 to 60
				Low caving potenti

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow e
		Limitation	Value	Limitat
212:				
Peters clay-------------------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) dep
		Bedrock (soft) depth < 20”	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	
219:				
Redding loam------------------	85	Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
220:				
Redding gravelly loam---------	85	No limitations		Limitations
				Clay from 40 to 60
				Low caving potenti
221:				
Redding gravelly loam---------	85	Limitations		Limitations
		Shrink-swell (LEP > 6)	1.00	Slopes > 15%
		Slopes > 15%	1.00	Clay from 40 to 60
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
236:				
San Joaquin sandy loam--------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
237:				
San Joaquin sandy loam--------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
241:				
San Joaquin sandy loam--------	45	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
San Joaquin, thick surface----	40	No limitations		Limitations
				Clay from 40 to 60
				Low caving potenti
266:				
Veritas fine sandy loam-------	85	Limitations		Limitations
		Rare flooding	0.50	Low caving potenti

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Limitation	Value	Shallow e...: Limitat...
285:				
Peters clay	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) dep
		Bedrock (soft) depth < 20"	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	
301:				
Archerdale clay loam	65	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
		Rare flooding	0.50	
Hicksville silt loam	20	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Caving potential
401:				
Peters silty clay loam	60	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) dep
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
		Bedrock (soft) depth < 20"	1.00	
Pentz loam	25	Limitations		Limitations
		Bedrock (soft) depth < 20"	1.00	Bedrock (soft) dep
		Shrink-swell (LEP 3-6)	0.01	Low caving potenti
451:				
Pentz silt loam	65	Limitations		Limitations
		Bedrock (soft) depth < 20"	1.00	Bedrock (soft) dep
		AASHTO GIN 5-8 (soil strength)	0.22	Low caving potenti
		Shrink-swell (LEP 3-6)	0.02	Slopes 8 to 15%
Peters silty clay loam	35	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) dep
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
		Bedrock (soft) depth < 20"	1.00	
452:				
Pentz silt loam	45	Limitations		Limitations
		Bedrock (soft) depth < 20"	1.00	Bedrock (soft) dep
		Shrink-swell (LEP 3-6)	0.01	Low caving potenti
		Slopes 8 to 15%	0.01	Slopes 8 to 15%
Peters silty clay loam	25	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) dep
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
		Bedrock (soft) depth < 20"	1.00	

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow e
		Limitation	Value	Limitat
452:				
Cometa sandy loam-------------	15	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Low caving potenti
		Shrink-swell (LEP > 6)	1.00	
475:				
Pentz silt loam---------------	60	Limitations		Limitations
		Slopes > 15%	1.00	Bedrock (soft) dep
		Bedrock (soft) depth < 20″	1.00	Slopes > 15%
		AASHTO GIN 5-8 (soil strength)	0.22	Low caving potenti
Peters silty clay loam--------	25	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Bedrock (soft) dep
		Shrink-swell (LEP > 6)	1.00	Low caving potenti
		Bedrock (soft) depth < 20″	1.00	
551:				
Amador loam-------------------	85	Limitations		Limitations
		Bedrock (soft) depth < 20″	1.00	Bedrock (soft) dep
		AASHTO GIN 5-8 (soil strength)	0.78	Low caving potenti
		Slopes 8 to 15%	0.01	Slopes 8 to 15%
575:				
Amador loam-------------------	85	Limitations		Limitations
		Bedrock (soft) depth < 20″	1.00	Bedrock (soft) dep
		Slopes > 15%	1.00	Slopes > 15%
		AASHTO GIN 5-8 (soil strength)	0.22	Low caving potenti
751:				
Auburn silt loam--------------	85	Limitations		Limitations
		Bedrock (hard) depth < 20″	1.00	Bedrock (hard) dep
		Slopes 8 to 15%	0.01	Low caving potenti
				Slopes 8 to 15%
775:				
Auburn silt loam--------------	85	Limitations		Limitations
		Bedrock (hard) depth < 20″	1.00	Bedrock (hard) dep
		Slopes > 15%	1.00	Slopes > 15%
				Low caving potenti
851:				
Mckeonhills clay--------------	85	Limitations		Limitations
		AASHTO GIN >8 (low soil strength)	1.00	Caving potential
		Shrink-swell (LEP > 6)	1.00	Clay from 40 to 60
		Slopes 8 to 15%	0.01	Slopes 8 to 15%

Table 9b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow e
		Limitation	Value	Limitat
999:				
Water-------------------------	100	Not rated		Not rated

The interpretation for *local roads and streets* evaluates the following soil properties at varyi flooding, ponding, wetness, slope, organic Unified classes for low soil strength (PT, OL, or OH), co to hard or soft bedrock, depth to a thick or thin cemented pan, fragments greater than 3 inches in s the caving potential of the soil.

The interpretation for *shallow excavations* evaluates the following soil properties at varying d flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as percent (LEP), potential for frost action, depth to hard or soft bedrock, depth to a thick or thin c greater than 3 inches in size, and soil strength expressed as the AASHTO Group Index Number (AASHTO

Table 10a.--Sanitary Facilities (Part 1)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA Office. indicates the dominant soil condition but does not eliminate the need for onsite investigation. The r columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The ra limitation with the highest value. Only the three highest value limitations are listed. There may b Fine-earth fractions and coarse fragments are reported on a weight basis. An explanation of the rati abbreviations used in describing the limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage l
		Limitation	Value	Limitati
100:				
Capay clay	90	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Ponded (any duratio
		Ponded (any duration)	1.00	Rare flooding
		Rare flooding	0.40	
102:				
Alamo clay	90	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Ponded (any duratio
		Ponded (any duration)	1.00	Depth to pan < 40"
		Depth to pan < 40"	1.00	Rare flooding
106:				
Archerdale, overwash	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Rare flooding
		Rare flooding	0.40	
107:				
Archerdale clay loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Rare flooding
		Rare flooding	0.40	
127:				
Chuloak sandy loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Permeability > 2"/h
		Seepage in bottom layer	1.00	Rare flooding
		Rare flooding	0.40	
128:				
Cogna loam	85	Limitations		Limitations
		Permeability of .6 - 2"/hr (slow perc)	0.50	Permeability > 2"/h
		Rare flooding	0.40	Rare flooding

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage l…: Limitati…
129:				
Cogna loam	85	Limitations		Limitations
		Permeability of .6 - 2"/hr (slow perc)	0.50	Permeability > 2"/h…
		Rare flooding	0.40	Rare flooding
130:				
Columbia, rarely flooded	85	Limitations		Limitations
		Seepage in bottom layer	1.00	Permeability > 2"/h…
		Rare flooding	0.40	Rare flooding
131:				
Columbia, occasionally flooded	85	Limitations		Limitations
		Flooding	1.00	Flooding ≥ occasion…
		Seepage in bottom layer	1.00	Permeability > 2"/h…
134:				
Cometa sandy loam	85	No limitations		Limitations
				Slopes 2 to 8%
				Permeability .6-2"/… seepage)
142:				
Delhi loamy sand	85	Limitations		Limitations
		Seepage in bottom layer	1.00	Permeability > 2"/h…
		Permeability > 6"/hr at 24-60" (seepage and poor filter)	1.00	
151:				
Mine dredge tailings	45	Limitations		Limitations
		Flooding	1.00	Flooding ≥ occasion…
		Seepage in bottom layer	1.00	Permeability > 2"/h…
		Permeability > 6"/hr at 24-60" (seepage and poor filter)	1.00	Slopes 2 to 8%
Riverwash	35	Limitations		Limitations
		Flooding	1.00	Flooding ≥ occasion…
		Saturation < 4' depth	1.00	Permeability > 2"/h…
		Seepage in bottom layer	1.00	
157:				
Exeter sandy clay loam	85	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
				Permeability .6-2"/… seepage)

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage l
		Limitation	Value	Limitatio
158:				
Finrod clay	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan from 4
		Depth to pan 40 to 72"	0.99	Rare flooding
		Rare flooding	0.40	
170:				
Hicksville loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Permeability .6-2"/ seepage)
172:				
Hicksville gravelly loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Permeability .6-2"/ seepage)
174:				
Hollenbeck silty clay	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan from 4
		Depth to pan 40 to 72"	0.99	Rare flooding
		Rare flooding	0.40	
175:				
Honcut fine sandy loam	85	Limitations		Limitations
		Seepage in bottom layer	1.00	Permeability > 2"/h
		Rare flooding	0.40	Rare flooding
176:				
Honcut sandy loam	85	Limitations		Limitations
		Seepage in bottom layer	1.00	Permeability > 2"/h
		Rare flooding	0.40	Rare flooding
				Slopes 2 to 8%
177:				
Honcut gravelly sandy loam	85	Limitations		Limitations
		Seepage in bottom layer	1.00	Permeability > 2"/h
		Rare flooding	0.40	Rare flooding
183:				
Jahant loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan from 4
				Slopes 2 to 8%
		Depth to pan 40 to 72"	0.83	Permeability .6-2"/ seepage)

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage: Limitati
187:				
Keyes gravelly loam----------------	45	Limitations		Limitations
		Depth to pan < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Depth to pan < 40"
				Slopes 2 to 8%
		Depth to bedrock < 40"	1.00	
Bellota sandy loam----------------	40	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Bedrock (soft) dept
				Depth to pan < 40"
		Depth to pan < 40"	1.00	Slopes 2 to 8%
		Depth to bedrock < 40"	1.00	
188:				
Keyes gravelly loam----------------	45	Limitations		Limitations
		Depth to pan < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Depth to pan < 40"
				Slopes 2 to 8%
		Depth to bedrock < 40"	1.00	
Redding gravelly loam--------------	40	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
				Permeability .6-2"/ seepage)
193:				
Madera sandy loam------------------	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan < 40"
		Depth to pan < 40"	1.00	
195:				
Clear Lake clay--------------------	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Ponded (any duratio
				Rare flooding
		Ponded (any duration)	1.00	Saturation from 3.5
		Saturation from 4 to 6' depth	0.84	
201:				
Nord loam--------------------------	85	Limitations		Limitations
		Permeability of .6 - 2"/hr (slow perc)	0.50	Permeability .6-2"/ seepage)
		Rare flooding	0.40	Rare flooding

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Septic tank absorption fields: Value	Sewage l… : Limitatio…
202:				
Pardee gravelly loam-------------	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	
206:				
Pentz fine sandy loam------------	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
				Slopes 2 to 8%
		Seepage in bottom layer	1.00	
207:				
Pentz fine sandy loam------------	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Slopes > 15%	1.00	Slopes > 8%
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
209:				
Pentz loam-----------------------	55	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
				Slopes > 8%
		Seepage in bottom layer	1.00	
Bellota loam---------------------	30	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Bedrock (soft) dept
				Depth to pan < 40"
		Depth to pan < 40"	1.00	Slopes 2 to 8%
		Depth to bedrock < 40"	1.00	
210:				
Pentz loam-----------------------	55	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
				Slopes > 8%
		Seepage in bottom layer	1.00	
Redding gravelly loam------------	25	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
		Restricted permeability due to bedrock or hardpan	1.00	Permeability .6-2"/ seepage)
				Slopes 2 to 8%

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage [cut off]: Limitatio[cut off]
212:				
Peters clay	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept[cut off]
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
219:				
Redding loam	85	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
				Permeability .6-2"/[cut off] seepage)
220:				
Redding gravelly loam	85	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
				Permeability .6-2"/[cut off] seepage)
221:				
Redding gravelly loam	85	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
		Slopes > 15%	1.00	Slopes > 8%
		Restricted permeability due to bedrock or hardpan	1.00	Permeability .6-2"/[cut off] seepage)
236:				
San Joaquin sandy loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan < 40"
		Depth to pan < 40"	1.00	
237:				
San Joaquin sandy loam	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan < 40"
				Slopes 2 to 8%
		Depth to pan < 40"	1.00	
241:				
San Joaquin sandy loam	45	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Depth to pan < 40"
		Depth to pan < 40"	1.00	

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Septic tank absorption fields: Value	Sewage l… Limitati…
241:				
San Joaquin, thick surface	40	Limitations		Limitations
		Depth to pan < 40"	1.00	Depth to pan < 40"
				Permeability .6-2"/…
				seepage)
266:				
Veritas fine sandy loam	85	Limitations		Limitations
		Depth to pan 40 to 72"	0.78	Permeability > 2"/h…
		Rare flooding	0.40	Rare flooding
				Depth to pan from 4…
285:				
Peters clay	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept…
		Restricted permeability due to bedrock or hardpan	1.00	
301:				
Archerdale clay loam	65	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Rare flooding
		Rare flooding	0.40	
Hicksville silt loam	20	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Permeability .6-2"/… seepage)
401:				
Peters silty clay loam	60	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept…
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
Pentz loam	25	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept…
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h…
				Slopes 2 to 8%
		Seepage in bottom layer	1.00	
451:				
Pentz silt loam	65	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept…
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h…
				Slopes > 8%
		Seepage in bottom layer	1.00	

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Limitation	Value	Sewage l...: Limitati...
451:				
Peters silty clay loam------------	35	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
452:				
Pentz silt loam------------------	45	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
				Slopes > 8%
		Seepage in bottom layer	1.00	
Peters silty clay loam------------	25	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
Cometa sandy loam----------------	15	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Slopes 2 to 8%
				Permeability .6-2"/ seepage)
475:				
Pentz silt loam------------------	60	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Slopes > 15%	1.00	Slopes > 8%
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
Peters silty clay loam------------	25	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Slopes 2 to 8%
551:				
Amador loam----------------------	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) dept
		Restricted permeability due to bedrock or hardpan	1.00	Slopes > 8%
				Permeability .6-2"/
		Slopes 8 to 15%	0.01	seepage)

Table 10a.--Sanitary Facilities (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage l
		Limitation	Value	Limitatio
575:				
Amador loam	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (soft) deptl
		Restricted permeability due to bedrock or hardpan	1.00	Slopes > 8%
				Permeability .6-2"/l seepage)
		Slopes > 15%	1.00	
751:				
Auburn silt loam	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (hard) deptl
		Restricted permeability due to bedrock or hardpan	1.00	Slopes > 8%
				Permeability > 2"/h
		Slopes 8 to 15%	0.01	
775:				
Auburn silt loam	85	Limitations		Limitations
		Depth to bedrock < 40"	1.00	Bedrock (hard) deptl
		Slopes > 15%	1.00	Slopes > 8%
		Restricted permeability due to bedrock or hardpan	1.00	Permeability > 2"/h
851:				
Mckeonhills clay	85	Limitations		Limitations
		Permeability < .6"/hr at 24-60" (slow perc)	1.00	Slopes > 8%
		Slopes 8 to 15%	0.01	
999:				
Water	100	Not rated		Not rated

The interpretation for *septic tanks adsorption fields* evaluates the following soil properties at vary soil: flooding; ponding; wetness; slope; subsidence of organic soils; depth to hard or soft bedrock; depth permeability that is too rapid, allowing seepage; and permeability that is too slow or an impermeable laye

The interpretation for *sewage lagoons* evaluates the following soil properties at varying depths in the ponding, wetness, slope, organic Unified classes for low strength (PT, OL, or OH), depth to hard or soft b cemented pan, rock fragments greater than 3 inches in size, and permeability that is too fast, allowing se

Table 10b.--Sanitary Facilities (Part 2)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA Office. The
indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbe
columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating
limitation with the highest value. Only the three highest value limitations are listed. There may be mor
earth fractions and coarse fragments are reported on a weight basis. An explanation of the rating criteri
abbreviations used in describing the limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area Sanitary landfill		Daily co
		Limitation	Value	Limitation	Value	Limi
100:						
Capay clay--------------	90	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Ponded (any duration)	1.00	Ponded (any
		Clay or silty clay	1.00	Rare flooding	0.40	Silty clay
		Rare flooding	0.50			Packing (OL
102:						
Alamo clay--------------	90	Limitations		Limitations		Limitations
		Ponded (any duration)	1.00	Depth to pan < 40"	1.00	Depth to pa
		Clay or silty clay	1.00	Ponded (any duration)	1.00	Ponded (any
		Rare flooding	0.50	Rare flooding	0.40	Silty clay
106:						
Archerdale, overwash----	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Rare flooding	0.40	Silty clay
		Rare flooding	0.50			Packing (OL
						Clay or sil
107:						
Archerdale clay loam----	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Rare flooding	0.40	Silty clay
		Rare flooding	0.50			Packing (OL
						Clay or sil
127:						
Chuloak sandy loam------	85	Limitations		Limitations		No Limitatio
		Seepage in bottom layer	1.00	Seepage in 20-40" depth	1.00	
		Rare flooding	0.50	Rare flooding	0.40	
128:						
Cogna loam--------------	85	Limitations		Limitations		No Limitatio
		Rare flooding	0.50	Seepage in 20-40" depth	1.00	
				Rare flooding	0.40	
129:						
Cogna loam--------------	85	Limitations		Limitations		No Limitatio
		Rare flooding	0.50	Seepage in 20-40" depth	1.00	
				Rare flooding	0.40	

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Limitation	Value	Area Sanitary landfill: Limitation	Value	Daily co[ver]: Limi[tation]
130:						
Columbia, rarely flooded	85	Limitations		Limitations		Limitations
		Sandy textures (COS, S, FS, LCOS, or VFS)	1.00	Seepage in 20-40" depth	1.00	Texture of
				Rare flooding	0.40	Permeabilit
		Seepage in bottom layer	1.00			
		Rare flooding	0.50			
131:						
Columbia, occasionally flooded----------------	85	Limitations		Limitations		Limitations
		Flooding ≥ occasional	1.00	Seepage in 20-40" depth	1.00	Permeabilit
		Seepage in bottom layer	1.00	Occasional flooding	0.60	Texture of VFS
		Sandy textures (COSL, LS, LFS, or LVFS)	0.50			
134:						
Cometa sandy loam-------	85	Limitations		No limitations		Limitations
		Clay loam, silty clay, silty clay loam	0.50			Silt or cla 10-60"
						Clay loam, silty clay
142:						
Delhi loamy sand--------	85	Limitations		Limitations		Limitations
		Seepage in bottom layer	1.00	Seepage in 20-40" depth	1.00	Permeabilit
		Sandy textures (COSL, LS, LFS, or LVFS)	0.50			Texture of VFS
151:						
Mine dredge tailings----	45	Not rated		Not rated		Not rated
Riverwash---------------	35	Not rated		Not rated		Not rated
157:						
Exeter sandy clay loam--	85	No limitations		Limitations		Limitations
				Depth to pan < 40"	1.00	Depth to pa
158:						
Finrod clay-------------	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	0.99	Silty clay
		Rare flooding	0.50	Rare flooding	0.40	Packing (OL
						Clay or sil
170:						
Hicksville loam---------	85	No limitations		No limitations		Limitations
						Fragments (

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Limitation	Value	Area Sanitary landfill: Limitation	Value	Daily co: Limi
172:						
Hicksville gravelly loam------------------	85	No limitations		No limitations		Limitations
						Fragments (
174:						
Hollenbeck silty clay---	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan 40-60"	0.96	Silty clay
		Rare flooding	0.50	Rare flooding	0.40	Packing (OL
		Depth to thin cemented pan	0.50			Clay or sil
175:						
Honcut sandy loam-------	85	Limitations		Limitations		Limitations
		Seepage in bottom layer	1.00	Seepage in 20-40" depth	1.00	Permeability
		Rare flooding	0.50	Rare flooding	0.40	
176:						
Honcut fine sandy loam--	85	Limitations		Limitations		Limitations
		Seepage in bottom layer	1.00	Seepage in 20-40" depth	1.00	Permeability
		Rare flooding	0.50	Rare flooding	0.40	
177:						
Honcut gravelly sandy loam------------------	85	Limitations		Limitations		Limitations
		Seepage in bottom layer	1.00	Seepage in 20-40" depth	1.00	Permeability
		Rare flooding	0.50	Rare flooding	0.40	Fragments (
183:						
Jahant loam-------------	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan 40-60"	0.54	Silty clay
		Depth to thin cemented pan	0.50			Packing (OL
						Clay or sil
187:						
Keyes gravelly loam-----	45	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Depth to pan < 40"	1.00	Depth to pa
				Bedrock depth < 40"	1.00	Silty clay
		Clay or silty clay	1.00			Packing (OL
		Depth to thin cemented pan	0.50			
Bellota sandy loam------	40	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Depth to pan < 40"	1.00	Depth to pa
				Bedrock depth < 40"	1.00	Depth to be
		Depth to thin cemented pan	0.50			

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area Sanitary landfill		Daily co
		Limitation	Value	Limitation	Value	Limi
188:						
Keyes gravelly loam-----	45	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Depth to pan < 40"	1.00	Depth to pa
				Bedrock depth < 40"	1.00	Silty clay
		Clay or silty clay	1.00			Packing (OL
Redding gravelly loam---	40	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	1.00	Depth to pa
						Silty clay
						Packing (OL
193:						
Madera sandy loam-------	85	No limitations		Limitations		Limitations
				Depth to pan < 40"	1.00	Depth to pa
195:						
Clear Lake clay---------	85	Limitations		Limitations		Limitations
		Saturation < 6' depth	1.00	Ponded (any duration)	1.00	Ponded (any
		Ponded (any duration)	1.00	Saturation < 5' depth	1.00	Silty clay
		Clay or silty clay	1.00	Rare flooding	0.40	Packing (OL
201:						
Nord loam---------------	85	Limitations		Limitations		No Limitatio
		Rare flooding	0.50	Rare flooding	0.40	
202:						
Pardee gravelly loam----	85	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be
						Fragments (
206:						
Pentz fine sandy loam---	85	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be
						Permeabilit
		Seepage in bottom layer	1.00			
207:						
Pentz fine sandy loam---	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Depth to be
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Slopes > 15
						Permeabilit
		Seepage in bottom layer	1.00			

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area Sanitary landfill		Daily co
		Limitation	Value	Limitation	Value	Limi
209:						
Pentz loam--------------	55	Limitations		Limitations		Limitations
		Lithic or paralithic	1.00	Bedrock depth < 40"	1.00	Depth to bec
		bedrock < 72"		Slopes 8 to 15%	0.01	Permeability
		Seepage in bottom layer	1.00			Slopes 8 to
		Slopes 8 to 15%	0.01			
Bellota loam------------	30	Limitations		Limitations		Limitations
		Lithic or paralithic	1.00	Depth to pan < 40"	1.00	Depth to par
		bedrock < 72"		Bedrock depth < 40"	1.00	Depth to bec
		Depth to thin cemented pan	0.50			
210:						
Pentz loam--------------	55	Limitations		Limitations		Limitations
		Lithic or paralithic	1.00	Bedrock depth < 40"	1.00	Depth to bec
		bedrock < 72"		Slopes 8 to 15%	0.01	Permeability
		Seepage in bottom layer	1.00			Slopes 8 to
		Slopes 8 to 15%	0.01			
Redding gravelly loam---	25	No limitations		Limitations		Limitations
				Depth to pan < 40"	1.00	Depth to par
						Fragments (
212:						
Peters clay-------------	85	Limitations		Limitations		Limitations
		Lithic or paralithic	1.00	Bedrock depth < 40"	1.00	Depth to bec
		bedrock < 72"				Silty clay
		Clay or silty clay	1.00			Packing (OL
219:						
Redding loam------------	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	1.00	Depth to par
						Silty clay
						Packing (OL
220:						
Redding gravelly loam---	85	No limitations		Limitations		Limitations
				Depth to pan < 40"	1.00	Depth to par
						Fragments (
221:						
Redding gravelly loam---	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	1.00	Depth to par
		Slopes > 15%	1.00	Slopes > 15%	1.00	Silty clay
						Packing (OL

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Limitation	Value	Area Sanitary landfill: Limitation	Value	Daily co: Limi
236:						
San Joaquin sandy loam--	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	1.00	Depth to pa
						Silty clay
						Packing (OL
237:						
San Joaquin sandy loam--	85	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	1.00	Depth to pa
						Silty clay
						Clay or sil
241:						
San Joaquin sandy loam--	45	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Depth to pan < 40"	1.00	Depth to pa
						Silty clay
						Packing (OL
San Joaquin, thick surface----------------	40	No limitations		Limitations		Limitations
				Depth to pan < 40"	1.00	Depth to pa
266:						
Veritas fine sandy loam-	85	Limitations		Limitations		Limitations
		Rare flooding	0.50	Seepage in 20-40" depth	1.00	Permeability
				Depth to pan 40-60"	0.42	Depth to pa
				Rare flooding	0.40	
285:						
Peters clay-------------	85	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be
						Silty clay
		Clay or silty clay	1.00			Packing (OL
301:						
Archerdale clay loam----	65	Limitations		Limitations		Limitations
		Clay or silty clay	1.00	Rare flooding	0.40	Silty clay
		Rare flooding	0.50			Packing (OL
						Clay or sil
Hicksville silt loam----	20	No limitations		No limitations		Limitations
						Fragments (

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Limitation	Value	Area Sanitary landfill: Limitation	Value	Daily co… Limi…
401:						
Peters silty clay loam--	60	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be…
						Silty clay …
		Clay or silty clay	1.00			Packing (OL…
Pentz loam--------------	25	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be…
						Permeabilit…
		Seepage in bottom layer	1.00			
451:						
Pentz silt loam---------	65	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be…
				Slopes 8 to 15%	0.01	Permeabilit…
		Seepage in bottom layer	1.00			Slopes 8 to…
		Slopes 8 to 15%	0.01			
Peters silty clay loam--	35	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be…
						Silty clay …
		Clay or silty clay	1.00			Packing (OL…
452:						
Pentz silt loam---------	45	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be…
				Slopes 8 to 15%	0.01	Permeabilit…
		Seepage in bottom layer	1.00			Slopes 8 to…
		Slopes 8 to 15%	0.01			
Peters silty clay loam--	25	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to be…
						Silty clay …
		Clay or silty clay	1.00			Packing (OL…
Cometa sandy loam-------	15	Limitations		No limitations		Limitations
		Clay loam, silty clay, silty clay loam	0.50			Silt or cla… 10-60"
						Clay loam, … silty clay…

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area Sanitary landfill		Daily co[ver]
		Limitation	Value	Limitation	Value	Limi[tation]
475:						
Pentz silt loam---------	60	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Depth to bed
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Slopes > 15
						Permeability
		Seepage in bottom layer	1.00			
Peters silty clay loam--	25	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to bed
						Silty clay
		Clay or silty clay	1.00			Packing (OL
551:						
Amador loam-------------	85	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to bed
				Slopes 8 to 15%	0.01	Slopes 8 to
		Slopes 8 to 15%	0.01			
575:						
Amador loam-------------	85	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to bed
				Slopes > 15%	1.00	Slopes > 15
		Slopes > 15%	1.00			
751:						
Auburn silt loam--------	85	Limitations		Limitations		Limitations
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Depth to bed
				Seepage in 20-40" depth	1.00	Slopes 8 to
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	
775:						
Auburn silt loam--------	85	Limitations		Limitations		Limitations
		Slopes > 15%	1.00	Slopes > 15%	1.00	Depth to bed
		Lithic or paralithic bedrock < 72"	1.00	Bedrock depth < 40"	1.00	Slopes > 15
				Seepage in 20-40" depth	1.00	
851:						
Mckeonhills clay--------	85	Limitations		Limitations		Limitations
		Slopes 8 to 15%	0.01	Slopes 8 to 15%	0.01	Packing (OL
						Slopes 8 to

Table 10b.--Sanitary Facilities (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area Sanitary landfill		Daily co
		Limitation	Value	Limitation	Value	Limi
999:						
Water-------------------	100	Not rated		Not rated		Not rated

Textures are abbreviated as: C--clay, CL--clay loam, COS--coarse sand, COSL--coarse sandy loam, FS--fine sa loam, L--loam, LCOS--loamy coarse sand, LFS--loamy fine sand, LS--loamy sand, LVFS--loamy very fine sand, S--san SCL--sandy clay loam, SI--silt, SIC--silty clay, SICL--silty clay loam, SIL--silt loam, SL--sandy loam, VFS--ver VFSL--very fine sandy loam.

The interpretation for *trench sanitary landfills* evaluates the following soil properties at varying depths flooding, ponding, wetness, slope, depth to hard or soft bedrock, depth to a thick or thin cemented pan, rock fr inches in size, sodium content (SAR), soil pH, clayey or sandy textures, and permeability that is too rapid, all some climates.

The interpretation for *area sanitary landfills* evaluates the following soil properties at varying depths in ponding, wetness, slope, depth to bedrock, depth to a cemented pan, and permeability that is too rapid, allowing climates.

The interpretation for *daily cover for landfill* evaluates the following soil properties at varying depths i wetness, slope, depth to bedrock, depth to a cemented pan, fragments greater than or less than 3 inches in size peat (PT), Unified classes for packing (OL, OH, CH, or MH), sandy or clayey textures, soil pH, carbonates, sodiu salinity (EC), soil climate, kaolinitic mineralogy, and permeability that is too rapid, allowing seepage.

Table 11.--Agricultural Waste Management

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table]

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
100:					
Capay clay-----------	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Slow water movement	1.00
		Runoff	0.40	Flooding	0.40
102:					
Alamo clay-----------	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40	Low adsorption	1.00
		Droughty	0.26	Flooding	0.40
		Depth to cemented pan	0.15	Droughty	0.26
106:					
Archerdale, overwash-	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
				Flooding	0.40
107:					
Archerdale clay loam----------------	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
				Flooding	0.40
127:					
Chuloak sandy loam---	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Flooding	0.40
		Too acid	0.03	Slow water movement	0.37
				Too acid	0.14
128:					
Cogna loam-----------	85	Somewhat limited		Somewhat limited	
		Too acid	0.01	Flooding	0.40
				Too acid	0.01
129:					
Cogna loam-----------	85	Somewhat limited		Somewhat limited	
		Too acid	0.01	Flooding	0.40
				Too acid	0.01
130:					
Columbia, rarely flooded------------	85	Not limited		Somewhat limited	
				Flooding	0.40

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
131:					
Columbia, occasionally flooded	85	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
134:					
Cometa sandy loam	85	Somewhat limited		Somewhat limited	
		Droughty	0.99	Droughty	0.99
		Runoff	0.40	Too acid	0.14
		Too acid	0.03		
142:					
Delhi loamy sand	85	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
		Leaching	0.45	Droughty	0.29
		Droughty	0.29		
151:					
Mine dredge tailings	45	Not rated		Not rated	
Riverwash	35	Not rated		Not rated	
157:					
Exeter sandy clay loam	85	Somewhat limited		Very limited	
		Droughty	0.53	Low adsorption	1.00
		Depth to cemented pan	0.42	Droughty	0.53
				Depth to cemented pan	0.42
158:					
Finrod clay	85	Very limited		Very limited	
		Slow water movement	1.00	Low adsorption	1.00
				Slow water movement	1.00
				Flooding	0.40
170:					
Hicksville loam	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slow water movement	0.37
		Too acid	0.03	Too acid	0.14
172:					
Hicksville gravelly loam	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slow water movement	0.37
		Too acid	0.03	Too acid	0.14
174:					
Hollenbeck silty clay	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Runoff	0.40	Low adsorption	1.00
		Droughty	0.03	Flooding	0.40
				Droughty	0.03

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
175:					
Honcut sandy loam----	85	Not limited		Somewhat limited	
				Flooding	0.40
176:					
Honcut fine sandy loam----------------	85	Not limited		Somewhat limited	
				Flooding	0.40
177:					
Honcut gravelly sandy loam----------	85	Not limited		Somewhat limited	
				Flooding	0.40
183:					
Jahant loam----------	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Runoff	0.40	Low adsorption	1.00
		Too acid	0.01	Too acid	0.03
187:					
Keyes gravelly loam--	45	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Depth to cemented pan	1.00	Slow water movement	1.00
		Droughty	1.00	Depth to cemented pan	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Runoff	0.40	Strongly contrasting textural stratification	1.00
Bellota sandy loam---	40	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.96	Low adsorption	1.00
		Strongly contrasting textural stratification	0.95	Droughty	0.96
		Runoff	0.40	Strongly contrasting textural stratification	0.95
		Depth to cemented pan	0.10	Depth to cemented pan	0.10
188:					
Keyes gravelly loam--	45	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Depth to cemented pan	1.00	Slow water movement	1.00
		Droughty	1.00	Depth to cemented pan	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Runoff	0.40	Strongly contrasting textural stratification	1.00

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
188:					
Redding gravelly loam----------------	40	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.97	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Depth to cemented pan	0.97
193:					
Madera sandy loam----	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Droughty	1.00	Strongly contrasting textural stratification	1.00
		Depth to cemented pan	0.90	Droughty	1.00
		Runoff	0.40	Depth to cemented pan	0.90
195:					
Clear Lake clay------	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Slow water movement	1.00
		Sodium content	0.68	Sodium content	0.68
		Runoff	0.40	Flooding	0.40
201:					
Nord loam------------	85	Not limited		Somewhat limited	
				Flooding	0.40
202:					
Pardee gravelly loam----------------	85	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Low adsorption	1.00
		Slow water movement	0.50	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.42
		Too acid	0.11	Slow water movement	0.37
206:					
Pentz fine sandy loam----------------	85	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.67
		Too acid	0.18		

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
207:					
Pentz fine sandy loam	85	Very limited		Very limited	
		Slope	1.00	Droughty	1.00
		Droughty	1.00	Low adsorption	1.00
		Depth to bedrock	1.00	Slope	1.00
		Runoff	0.40	Depth to bedrock	1.00
		Too acid	0.11	Too acid	0.42
209:					
Pentz loam	55	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.67
		Too acid	0.18	Slope	0.01
		Slope	0.01		
Bellota loam	30	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.96	Low adsorption	1.00
		Strongly contrasting textural stratification	0.95	Droughty	0.96
		Runoff	0.40	Strongly contrasting textural stratification	0.95
		Depth to cemented pan	0.10	Depth to cemented pan	0.10
210:					
Pentz loam	55	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.67
		Too acid	0.18	Slope	0.01
		Slope	0.01		
Redding gravelly loam	25	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.97	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Depth to cemented pan	0.97
		Too acid	0.11	Too acid	0.42
212:					
Peters clay	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Low adsorption	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Slow water movement	1.00

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
219:					
Redding loam	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.42	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Too acid	0.42
220:					
Redding gravelly loam	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.97	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Depth to cemented pan	0.97
221:					
Redding gravelly loam	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Slope	1.00	Strongly contrasting textural stratification	1.00
		Depth to cemented pan	0.97	Slope	1.00
236:					
San Joaquin sandy loam	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.90	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Depth to cemented pan	0.90

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
237:					
San Joaquin sandy loam	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.90	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Depth to cemented pan	0.90
241:					
San Joaquin sandy loam	45	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Slow water movement	1.00
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Depth to cemented pan	0.90	Strongly contrasting textural stratification	1.00
		Runoff	0.40	Depth to cemented pan	0.90
San Joaquin, thick surface	40	Very limited		Very limited	
		Strongly contrasting textural stratification	1.00	Low adsorption	1.00
		Droughty	0.97	Strongly contrasting textural stratification	1.00
		Depth to cemented pan	0.90	Droughty	0.97
		Runoff	0.40	Depth to cemented pan	0.90
		Too acid	0.03	Too acid	0.14
266:					
Veritas fine sandy loam	85	Not limited		Very limited	
				Low adsorption	1.00
				Flooding	0.40
285:					
Peters clay	85	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Low adsorption	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Slow water movement	1.00
301:					
Archerdale clay loam	65	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
				Flooding	0.40

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
301:					
Hicksville silt loam	20	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slow water movement	0.37
		Too acid	0.03	Too acid	0.14
401:					
Peters silty clay loam	60	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slow water movement	1.00
		Runoff	0.40		
Pentz loam	25	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.55
		Too acid	0.14		
451:					
Pentz silt loam	65	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.55
		Too acid	0.14	Slope	0.01
		Slope	0.01		
Peters silty clay loam	35	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slow water movement	1.00
		Runoff	0.40		
452:					
Pentz silt loam	45	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.55
		Too acid	0.14	Slope	0.01
		Slope	0.01		
Peters silty clay loam	25	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slow water movement	1.00
		Runoff	0.40		
Cometa sandy loam	15	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.99	Low adsorption	1.00
		Runoff	0.40	Droughty	0.99
		Too acid	0.03	Too acid	0.14

Table 11.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
475:					
Pentz silt loam------	60	Very limited		Very limited	
		Slope	1.00	Droughty	1.00
		Droughty	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Too acid	0.55
		Too acid	0.14		
Peters silty clay loam----------------	25	Very limited		Very limited	
		Slow water movement	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slow water movement	1.00
		Runoff	0.40		
551:					
Amador loam----------	85	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Low adsorption	1.00
		Too acid	0.78	Depth to bedrock	1.00
		Runoff	0.40	Too acid	1.00
		Slope	0.01	Slope	0.01
575:					
Amador loam----------	85	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Low adsorption	1.00
		Slope	1.00	Depth to bedrock	1.00
		Too acid	0.78	Too acid	1.00
		Runoff	0.40	Slope	1.00
751:					
Auburn silt loam-----	85	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Low adsorption	1.00
		Runoff	0.40	Depth to bedrock	1.00
		Too acid	0.18	Too acid	0.67
		Slope	0.01	Slope	0.01
775:					
Auburn silt loam-----	85	Very limited		Very limited	
		Slope	1.00	Droughty	1.00
		Droughty	1.00	Low adsorption	1.00
		Depth to bedrock	1.00	Slope	1.00
		Runoff	0.40	Depth to bedrock	1.00
		Too acid	0.18	Too acid	0.67
851:					
Mckeonhills clay-----	85	Very limited		Very limited	
		Slow water movement	1.00	Low adsorption	1.00
		Runoff	0.40	Slow water movement	1.00
		Droughty	0.04	Droughty	0.04
		Shallow to densic materials	0.01	Shallow to densic materials	0.01
		Slope	0.01	Slope	0.01
999:					
Water----------------	100	Not rated		Not rated	

Table 12a.--Construction Materials (Part 1)

[The information in this table is based on interpretations developed by the Pacific Southwest MLRA Office. The i
the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the va
from 0.00 to 0.99. The closer the value is to 0.0, the greater the potential limitation. Values of 0.0 are
based on the soil property criteria used to develop the interpretation. Values closer to 1.0 have less of a
Features with a value of 1.0 have absolutely no limitation and are not shown in this table. Rating classes
the most limiting value. Fine-earth fractions are reported on a weight basis. An explanation of the rating
abbreviations used in describing the limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia… Rating… limitin…
100:						
Capay clay-------------	90	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
102:						
Alamo clay-------------	90	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
106:						
Archerdale, overwash---	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
107:						
Archerdale clay loam---	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
127:						
Chuloak sandy loam-----	85	Poor source		Fair source		Fair sourc
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.03	
128:						
Cogna loam-------------	85	Poor source		Poor source		Good sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia... Rating... limitin...
129:						
Cogna, loam	85	Poor source		Poor source		Good sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
130:						
Columbia, rarely flooded	85	Poor source		Fair source		Good sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.03	
131:						
Columbia, occasionally flooded	85	Poor source		Fair source		Good sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.03	
134:						
Cometa sandy loam	85	Poor source		Fair source		Fair sourc
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Clay 27
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.03	
142:						
Delhi loamy sand	85	Poor source		Fair source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer is a possible source	0.09	Sand fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.09	
151:						
Mine dredge tailings	45	Not Rated		Not Rated		Not rated
Riverwash	35	Not Rated		Not Rated		Not rated
157:						
Exeter sandy clay loam	85	Poor source		Poor source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia: Rating limitin
158:						
Finrod clay------------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
170:						
Hicksville loam--------	85	Poor source		Fair source		Poor sourc
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.03	Hard to
						Clay 27
172:						
Hicksville gravelly loam------------------	85	Poor source		Fair source		Poor sourc
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.03	Hard to
						Clay 27
174:						
Hollenbeck silty clay--	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
175:						
Honcut sandy loam------	85	Poor source		Fair source		Fair sourc
		Bottom layer not a source	0.00	Thickest layer possible source	0.03	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible	0.05	
176:						
Honcut fine sandy loam-	85	Poor source		Fair source		Fair sourc
		Bottom layer not a source	0.00	Thickest layer possible source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.05	
177:						
Honcut gravelly sandy loam------------------	85	Poor source		Fair source		Poor sourc
		Bottom layer not a source	0.00	Thickest layer possible source	0.03	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.06	Hard to

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Potential source of gravel: Value	Potential source of sand: Rating class and limiting features	Potential source of sand: Value	Potentia… Rating… limitin…
183:						
Jahant loam------------	85	Poor source		Poor source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
187:						
Keyes gravelly loam----	45	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
						Depth to
Bellota sandy loam-----	40	Poor source		Poor source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
						Depth to
188:						
Keyes gravelly loam----	45	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
						Depth to
Redding gravelly loam--	40	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
193:						
Madera sandy loam------	85	Poor source		Poor source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
195:						
Clear Lake clay--------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	SAR 4 to
201:						
Nord loam--------------	85	Poor source		Poor source		Good sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia: Rating limitir
202:						
Pardee gravelly loam---	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth tc
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
206:						
Pentz fine sandy loam--	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth tc
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
207:						
Pentz fine sandy loam--	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Slope >
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.00	Depth tc
						Rock fra
						Sand fra or null
209:						
Pentz loam-------------	55	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth tc
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
Bellota loam-----------	30	Poor source		Poor source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth tc
						Depth tc
210:						
Pentz loam-------------	55	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth tc
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
Redding gravelly loam--	25	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth tc

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia[l]: Rating[] limitin[]
212:						
Peters clay------------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
219:						
Redding loam-----------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
220:						
Redding gravelly loam--	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
221:						
Redding gravelly loam--	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Slope >
						Depth to
236:						
San Joaquin sandy loam-	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
237:						
San Joaquin sandy loam-	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
241:						
San Joaquin sandy loam-	45	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia: Rating limitir
241:						
San Joaquin, thick surface---------------	40	Poor source		Fair source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth t
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.03	
266:						
Veritas fine sandy loam	85	Poor source		Poor source		Good sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
285:						
Peters clay------------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth t
301:						
Archerdale clay loam---	65	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
Hicksville silt loam---	20	Poor source		Fair source		Poor sourc
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Rock fra
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.03	Hard to
						Clay 27
401:						
Peters silty clay loam-	60	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth t
Pentz loam-------------	25	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth t
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
451:						
Pentz silt loam--------	65	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth t
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia... Rating... limitin...
451:						
Peters silty clay loam-	35	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
452:						
Pentz silt loam--------	45	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
Peters silty clay loam-	25	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
Cometa sandy loam------	15	Poor source		Poor source		Fair sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay 27
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
475:						
Pentz silt loam--------	60	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Slope >
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
Peters silty clay loam-	25	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
551:						
Amador loam------------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	pH of 4.
575:						
Amador loam------------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Slope >
						pH of 4.
						Rock fra

Table 12a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potentia…: Rating… limitin…
751:						
Auburn silt loam-------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fra
775:						
Auburn silt loam-------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Slope >
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to
						Rock fra
851:						
Mckeonhills clay-------	85	Poor source		Poor source		Poor sourc
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Clay > 4
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	
999:						
Water------------------	100	Not Rated		Not Rated		Not rated

The interpretation for *gravel* evaluates coarse fragments greater than 0.2 inch in size in the bottom layer c
layer of the soil.

The interpretation for *sand* evaluates the content of sand and fine gravel in the thickest layer or in the bo
soil. Organic soil layers with a Unified engineering class for peat (PT) are also evaluated.

The interpretation for *topsoil* evaluates the following soil properties at varying depths: calcium carbonates
bulk density, sand content, soil wetness, coarse fragments 0.2 to 3 inches in size, rock fragments greater than 3
content of organic matter (OM), sodium content expressed as the sodium adsorption ratio (SAR), salinity expressed
electrical conductivity (EC), depth to bedrock, slope, and soil pH.

Table 12b.--Construction Materials (Part 2)

[The information in this table is based on interpretations developed by the Pacific Southwest
information indicates the dominant soil condition but does not eliminate the need for on
The numbers in the value columns range from 0.00 to 0.99. The closer the value is to 0.
potential limitation. Values of 0.0 are absolute limitations based on the soil property
develop the interpretation. Values closer to 1.0 have less of a limitation. Features w
have absolutely no limitation and are not shown in this table. Rating classes are dete
limiting value. Fine-earth fractions are reported on a weight basis. An explanation of
and of the abbreviations used in describing the limitations is given at the end of the t

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential road
		Rating class and limiting features	Value	Rating clas limiting fea
100:				
Capay clay------------------	90	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (lov
				LEP 3 to 9
102:				
Alamo clay------------------	90	Poor source		Poor source
		Clay > 40%	0.00	Depth to pan < 40"
		OM < .5%	0.00	AASHTO GIN > 8 (lov
		AWC of 3-6” to 60” depth	0.74	LEP 3 to 9
		Depth to pan 20-40”	0.85	
106:				
Archerdale, overwash--------	85	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (lov
		K-factor of .10 -.35	0.37	LEP 3 to 9
107:				
Archerdale clay loam--------	85	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (lov
				LEP 3 to 9
127:				
Chuloak sandy loam----------	85	Poor source		Fair source
		OM < .5%	0.00	LEP 3 to 9
		pH of 4-6.5 above 40”	0.84	
128:				
Cogna loam------------------	85	Fair source		Poor source
		OM of .5 to 1%	0.50	AASHTO GIN > 8 (lov
		K-factor of .10 -.35	0.68	
		pH of 4-6.5 above 40”	0.96	

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential road
		Rating class and limiting features	Value	Rating clas limiting fea
129:				
Cogna loam	85	Fair source		Poor source
		OM of .5 to 1%	0.50	AASHTO GIN > 8 (lov
		K-factor of .10 -.35	0.68	
		pH of 4-6.5 above 40″	0.96	
130:				
Columbia, rarely flooded	85	Poor source		Poor source
		OM < .5%	0.00	AASHTO GIN > 8 (lov
131:				
Columbia, occasionally flooded	85	Poor source		Poor source
		OM < .5%	0.00	AASHTO GIN > 8 (lov
		K-factor of .10 -.35	0.90	
134:				
Cometa sandy loam	85	Poor source		Poor source
		OM < .5%	0.00	AASHTO GIN > 8 (lov
		AWC of 3-6″ to 60″ depth	0.00	LEP 3 to 9
		Clay 27 to 40%	0.02	
		pH of 4-6.5 above 40″	0.84	
142:				
Delhi loamy sand	85	Poor source		Good source
		WEG = 1 or 2	0.00	
		Sand fractions 75 to 85%	0.08	
		OM of .5 to 1%	0.50	
		AWC of 3-6″ to 60″ depth	0.71	
151:				
Mine dredge tailings	45	Not rated		Not rated
Riverwash	35	Not rated		Not rated
157:				
Exeter sandy clay loam	85	Poor source		Poor source
		OM < .5%	0.00	Depth to pan < 40"
		AWC of 3-6″ to 60″ depth	0.47	LEP 3 to 9
		Depth to pan 20-40″	0.58	

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential roac: Rating clas limiting fea
158:				
Finrod clay-----------------	85	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (lov
				Depth to pan 40-60'
				LEP 3 to 9
170:				
Hicksville loam-------------	85	Poor source		Fair source
		OM < .5%	0.00	LEP 3 to 9
		pH of 4-6.5 above 40″	0.84	
		Clay 27 to 40%	0.98	
172:				
Hicksville gravelly loam----	85	Poor source		Fair source
		OM < .5%	0.00	LEP 3 to 9
		pH of 4-6.5 above 40″	0.84	
		Clay 27 to 40%	0.98	
174:				
Hollenbeck silty clay-------	85	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (lov
		AWC of 3-6″ to 60″ depth	0.97	Depth to pan 40-60'
		K-factor < .10 or null	0.99	LEP 3 to 9
175:				
Honcut fine sandy loam------	85	Poor source		Good source
		OM < .5%	0.00	
176:				
Honcut sandy loam-----------	85	Poor source		Good source
		OM < .5%	0.00	
177:				
Honcut gravelly sandy loam--	85	Poor source		Good source
		OM < .5%	0.00	
183:				
Jahant loam-----------------	85	Fair source		Poor source
		OM of .5 to 1%	0.50	AASHTO GIN > 8 (lov
		pH of 4-6.5 above 40″	0.92	Depth to pan 40-60'
				LEP 3 to 9

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Potential source of reclamation material: Value	Potential roac: Rating clas limiting fea
187:				
Keyes gravelly loam---------	45	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan < 20"	0.00	AASHTO GIN > 8 (lov
				Depth to bedrock <
				LEP 3 to 9
Bellota sandy loam----------	40	Poor source		Poor source
		OM < .5%	0.00	Depth to pan < 40"
		AWC of 3-6” to 60” depth	0.04	Depth to bedrock <
		Depth to pan 20-40”	0.90	LEP 3 to 9
		pH of 4-6.5 above 40”	0.92	
188:				
Keyes gravelly loam---------	45	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan < 20"	0.00	AASHTO GIN > 8 (lov
		pH of 4-6.5 above 40”	0.76	Depth to bedrock <
				LEP 3 to 9
Redding gravelly loam-------	40	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan 20-40”	0.03	AASHTO GIN > 8 (lov
		pH of 4-6.5 above 40”	0.64	LEP 3 to 9
193:				
Madera sandy loam-----------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan 20-40”	0.10	LEP 3 to 9
		OM of .5 to 1%	0.50	
195:				
Clear Lake clay-------------	85	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (lov
		OM < .5%	0.00	LEP 3 to 9
		SAR from 4 to 13	0.40	
201:				
Nord loam-------------------	85	Fair source		Good source
		K-factor of .10 -.35	0.90	
202:				
Pardee gravelly loam--------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40”	0.72	

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential road: Rating clas limiting fea
206:				
Pentz fine sandy loam-------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40"	0.64	
207:				
Pentz fine sandy loam-------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40"	0.72	Slopes > 25%
209:				
Pentz loam------------------	55	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40"	0.64	
Bellota loam----------------	30	Poor source		Poor source
		OM < .5%	0.00	Depth to pan < 40"
		AWC of 3-6" to 60" depth	0.04	Depth to bedrock <
		Depth to pan 20-40"	0.90	LEP 3 to 9
		pH of 4-6.5 above 40"	0.92	
210:				
Pentz loam------------------	55	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40"	0.64	
Redding gravelly loam-------	25	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan 20-40"	0.03	LEP 3 to 9
		pH of 4-6.5 above 40"	0.72	
212:				
Peters clay-----------------	85	Poor source		Poor source
		Clay > 40%	0.00	Depth to bedrock <
		AWC < 3" to 60" depth	0.00	AASHTO GIN > 8 (lov
				LEP 3 to 9
219:				
Redding loam----------------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan 20-40"	0.58	AASHTO GIN > 8 (lov
		pH of 4-6.5 above 40"	0.72	LEP 3 to 9

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential ... road...: Rating clas... limiting fea...
220:				
Redding gravelly loam-------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan 20-40″	0.03	
		pH of 4-6.5 above 40″	0.60	
		OM of .5 to 1%	0.96	
221:				
Redding gravelly loam-------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		Depth to pan 20-40″	0.03	AASHTO GIN > 8 (lov
		pH of 4-6.5 above 40″	0.72	LEP 3 to 9
236:				
San Joaquin sandy loam------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		OM < .5%	0.00	AASHTO GIN > 8 (lov
		Clay > 40%	0.00	LEP 3 to 9
		Depth to pan 20-40″	0.10	
		pH of 4-6.5 above 40″	0.84	
237:				
San Joaquin sandy loam------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		OM < .5%	0.00	AASHTO GIN > 8 (lov
		Clay > 40%	0.00	LEP 3 to 9
		Depth to pan 20-40″	0.10	
		pH of 4-6.5 above 40″	0.84	
241:				
San Joaquin sandy loam------	45	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to pan < 40"
		OM < .5%	0.00	AASHTO GIN > 8 (lov
		Clay > 40%	0.00	LEP 3 to 9
		Depth to pan 20-40″	0.10	
		pH of 4-6.5 above 40″	0.84	
		K-factor < .10 or null	0.99	
San Joaquin, thick surface--	40	Fair source		Poor source
		AWC of 3-6″ to 60″ depth	0.03	Depth to pan < 40"
		Depth to pan 20-40″	0.10	
		OM of .5 to 1%	0.50	
		pH of 4-6.5 above 40″	0.84	

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential ... roac: Rating clas limiting fea
266:				
Veritas fine sandy loam-----	85	Poor source		Fair source
		OM < .5%	0.00	Depth to pan 40-60"
285:				
Peters clay-----------------	85	Poor source		Poor source
		Clay > 40%	0.00	Depth to bedrock <
		AWC < 3" to 60" depth	0.00	AASHTO GIN > 8 (low
				LEP 3 to 9
301:				
Archerdale clay loam--------	65	Poor source		Poor source
		Clay > 40%	0.00	AASHTO GIN > 8 (low
				LEP 3 to 9
Hicksville silt loam--------	20	Poor source		Fair source
		OM < .5%	0.00	LEP 3 to 9
		pH of 4-6.5 above 40”	0.84	
		Clay 27 to 40%	0.98	
401:				
Peters silty clay loam------	60	Poor source		Poor source
		Clay > 40%	0.00	Depth to bedrock <
		AWC < 3" to 60" depth	0.00	AASHTO GIN > 8 (low
				LEP > 9
Pentz loam------------------	25	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40”	0.68	LEP 3 to 9
451:				
Pentz silt loam-------------	65	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40”	0.68	AASHTO GIN 5 to 8
				LEP 3 to 9
Peters silty clay loam------	35	Poor source		Poor source
		Clay > 40%	0.00	Depth to bedrock <
		AWC < 3" to 60" depth	0.00	AASHTO GIN > 8 (low
				LEP > 9
452:				
Pentz silt loam-------------	45	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40”	0.68	LEP 3 to 9

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential roac
		Rating class and limiting features	Value	Rating clas limiting fea
452:				
Peters silty clay loam------	25	Poor source		Poor source
		Clay > 40%	0.00	Depth to bedrock <
		AWC < 3" to 60" depth	0.00	AASHTO GIN > 8 (low
				LEP > 9
Cometa sandy loam-----------	15	Poor source		Poor source
		OM < .5%	0.00	AASHTO GIN > 8 (low
		AWC of 3-6” to 60” depth	0.00	LEP 3 to 9
		Clay 27 to 40%	0.02	
		pH of 4-6.5 above 40”	0.84	
475:				
Pentz silt loam-------------	60	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH of 4-6.5 above 40”	0.68	Slopes > 25%
		K-factor < .10 or null	0.99	AASHTO GIN 5 to 8 (
				LEP 3 to 9
Peters silty clay loam------	25	Poor source		Poor source
		Clay > 40%	0.00	Depth to bedrock <
		AWC < 3" to 60" depth	0.00	AASHTO GIN > 8 (low
				LEP > 9
551:				
Amador loam-----------------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH is < 4 below 40"	0.00	AASHTO GIN 5 to 8 (
		OM < .5%	0.00	
575:				
Amador loam-----------------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		pH is < 4 below 40"	0.00	AASHTO GIN 5 to 8 (
		OM < .5%	0.00	
751:				
Auburn silt loam------------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		OM of .5 to 1%	0.02	
		pH of 4-6.5 above 40”	0.64	
		K-factor of .10 -.35	0.90	

Table 12b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential roac
		Rating class and limiting features	Value	Rating clas limiting fea
775:				
Auburn silt loam------------	85	Poor source		Poor source
		AWC < 3" to 60" depth	0.00	Depth to bedrock <
		OM < .5%	0.00	Slopes > 25%
		pH of 4-6.5 above 40”	0.64	
		K-factor of .10 -.35	0.90	
851:				
Mckeonhills clay------------	85	Poor source		Poor source
		Clay > 40%	0.00	LEP > 9
		AWC of 3-6” to 60” depth	0.96	AASHTO GIN > 8 (lov
999:				
Water-----------------------	100	Not rated		Not rated

The interpretation for *reclamation material* evaluates the following soil properties at v soil: content of sand, clay, and rock fragments; content of organic matter (OM); Wind Erodibi available water capacity (AWC); soil pH; salinity (EC); content of sodium (SAR); carbonates; the soil to water erosion (K factor).

The interpretation for *roadfill* evaluates the following soil properties at varying depth shrink-swell potential expressed as linear extensibility percent (LEP), depth to rock or a ce slope, soil strength expressed as AASHTO Group Index Number (AASHTO GIN), and content of rock

Table 13.--Water Management

[The information in this table is based on interpretations developed by the Pacific Southwest ML
information indicates the dominant soil condition but does not eliminate the need for onsit
The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greate
limitation. The rating is based on the limitation with the highest value. Only the three
limitations are listed. There may be more limitations. Fine-earth fractions and coarse fr
on a weight basis. An explanation of the rating criteria and of the abbreviations used in
limitations is given at the end of the table]

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reser
		Limitation	Value	Limitati
100:				
Capay clay------------------	90	Limitations		No limitations
		Ponded (any duration)	1.00	
		Shrink-swell (LEP >6)	1.00	
		MH or CH Unified and PI <40%	0.50	
102:				
Alamo clay------------------	90	Limitations		Limitations
		Ponded (any duration)	1.00	Depth to pan 20 to 6
		Shrink-swell (LEP >6)	1.00	
		Thin layer	0.74	
106:				
Archerdale, overwash--------	85	Limitations		No limitations
		Shrink-swell (LEP >6)	1.00	
		MH or CH Unified and PI <40%	0.50	
107:				
Archerdale clay loam--------	85	Limitations		No limitations
		Shrink-swell (LEP >6)	1.00	
		MH or CH Unified and PI <40%	0.50	
127:				
Chuloak sandy loam----------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Permeability > 2"/hr
128:				
Cogna loam------------------	85	Limitations		Limitations
		High piping potential	0.62	Permeability > 2"/hr
		Shrink-swell (LEP 3-6)	0.50	
129:				
Cogna loam------------------	85	Limitations		Limitations
		High piping potential	0.62	Permeability > 2"/hr
		Shrink-swell (LEP 3-6)	0.50	

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees: Limitation	Value	Pond reserv: Limitatio
130:				
Columbia, rarely flooded----	85	Limitations		Limitations
		High piping potential	0.49	Permeability > 2"/hr
131:				
Columbia, occasionally flooded--------------------	85	Limitations		Limitations
		High piping potential	0.93	Permeability > 2"/hr
134:				
Cometa sandy loam-----------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Permeability .6-2"/h
		Thin layer	0.48	Slopes 2 to 7%
142:				
Delhi loamy sand------------	85	Limitations		Limitations
		Possible seepage problem	0.50	Permeability > 2"/hr
151:				
Mine dredge tailings--------	45	No limitations		Limitations
		Slight seepage problem	0.10	Permeability > 2"/hr
				Slopes 2 to 7%
Riverwash------------------	35	Limitations		Limitations
		Saturation < 2' depth	1.00	Permeability > 2"/hr
		Seepage problem	1.00	
157:				
Exeter sandy clay loam------	85	Limitations		Limitations
		Thin layer	0.85	Depth to pan 20 to 6
		Shrink-swell (LEP 3-6)	0.50	Permeability .6-2"/h
158:				
Finrod clay-----------------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		MH or CH Unified and PI <40%	0.50	
		Thin layer	0.46	
170:				
Hicksville loam-------------	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Permeability .6-2"/h
172:				
Hicksville gravelly loam----	85	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Permeability .6-2"/h

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reser
		Limitation	Value	Limitati
174:				
Hollenbeck silty clay-------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		MH or CH Unified and PI <40%	0.50	
		Thin layer	0.37	
175:				
Honcut sandy loam-----------	85	No limitations		Limitations
				Permeability > 2"/hr
176:				
Honcut fine sandy loam------	85	No limitations		Limitations
				Permeability > 2"/hr
				Slopes 2 to 7%
177:				
Honcut gravelly sandy loam--	85	No limitations		Limitations
				Permeability > 2"/hr
183:				
Jahant loam-----------------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Permeability .6-2"/h
		MH or CH Unified and PI <40%	0.50	Slopes 2 to 7%
		Thin layer	0.13	Depth to pan 20 to 6
187:				
Keyes gravelly loam---------	45	Limitations		Limitations
		Thin layer	1.00	Depth to pan < 20"
		Shrink-swell (LEP >6)	1.00	Depth to bedrock fro
		MH or CH Unified and PI <40%	0.50	Slopes 2 to 7%
Bellota sandy loam----------	40	Limitations		Limitations
		Thin layer	0.70	Depth to pan 20 to 6
		Shrink-swell (LEP 3-6)	0.50	Depth to bedrock fro
				Slopes 2 to 7%
188:				
Keyes gravelly loam---------	45	Limitations		Limitations
		Thin layer	1.00	Depth to pan < 20"
		Shrink-swell (LEP >6)	1.00	Depth to bedrock fro
		MH or CH Unified and PI <40%	0.50	Slopes 2 to 7%
Redding gravelly loam-------	40	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		Thin layer	0.99	Permeability .6-2"/h
		MH or CH Unified and PI <40%	0.50	Slopes 2 to 7%

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reser
		Limitation	Value	Limitatio
193:				
Madera sandy loam	85	Limitations		Limitations
		Thin layer	0.98	Depth to pan 20 to 6
		Shrink-swell (LEP 3-6)	0.50	
195:				
Clear Lake clay	85	Limitations		No limitations
		Ponded (any duration)	1.00	
		Shrink-swell (LEP >6)	1.00	
		MH or CH Unified and PI <40%	0.50	
201:				
Nord loam	85	Limitations		Limitations
		Very high piping potential	1.00	Permeability .6-2"/h
202:				
Pardee gravelly loam	85	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
206:				
Pentz fine sandy loam	85	Limitations		Limitations
		Thin layer	1.00	Permeability > 2"/hr
		Very high piping potential	1.00	Depth to bedrock < 2
				Slopes 2 to 7%
207:				
Pentz fine sandy loam	85	Limitations		Limitations
		Thin layer	1.00	Slopes > 7%
				Permeability > 2"/hr
				Depth to bedrock < 2
209:				
Pentz loam	55	Limitations		Limitations
		Thin layer	1.00	Permeability > 2"/hr
		Very high piping potential	1.00	Depth to bedrock < 2
				Slopes > 7%
Bellota loam	30	Limitations		Limitations
		Thin layer	0.70	Depth to pan 20 to 6
		Shrink-swell (LEP 3-6)	0.50	Depth to bedrock fro
				Slopes 2 to 7%
210:				
Pentz loam	55	Limitations		Limitations
		Thin layer	1.00	Permeability > 2"/hr
		Very high piping potential	1.00	Depth to bedrock < 2
				Slopes > 7%

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reser
		Limitation	Value	Limitati
210:				
Redding gravelly loam-------	25	Limitations		Limitations
		Thin layer	0.99	Depth to pan 20 to 6
				Permeability .6-2"/h
				Slopes 2 to 7%
212:				
Peters clay-----------------	85	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
		Shrink-swell (LEP >6)	1.00	Slopes 2 to 7%
		MH or CH Unified and PI <40%	0.50	
219:				
Redding loam----------------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		Thin layer	0.85	Permeability .6-2"/h
		MH or CH Unified and PI <40%	0.50	
220:				
Redding gravelly loam-------	85	Limitations		Limitations
		Thin layer	0.99	Depth to pan 20 to 6
				Permeability .6-2"/h
				Slopes 2 to 7%
221:				
Redding gravelly loam-------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Slopes > 7%
		Thin layer	0.99	Depth to pan 20 to 6
		MH or CH Unified and PI <40%	0.50	Permeability .6-2"/h
236:				
San Joaquin sandy loam------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		Thin layer	0.98	
		MH or CH Unified and PI <40%	0.50	
237:				
San Joaquin sandy loam------	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		Thin layer	0.98	Slopes 2 to 7%
241:				
San Joaquin sandy loam------	45	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Depth to pan 20 to 6
		Thin layer	0.98	
		MH or CH Unified and PI <40%	0.50	

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees: Limitation	Value	Pond reserv[...]: Limitati[...]
241:				
San Joaquin, thick surface--	40	Limitations		Limitations
		Thin layer	0.98	Depth to pan 20 to 6[...]
				Permeability .6-2"/h[...]
266:				
Veritas fine sandy loam-----	85	Limitations		Limitations
		Thin layer	0.11	Permeability > 2"/hr
				Depth to pan 20 to 6[...]
285:				
Peters clay-----------------	85	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2[...]
		Shrink-swell (LEP >6)	1.00	
		MH or CH Unified and PI <40%	0.50	
301:				
Archerdale clay loam--------	65	Limitations		No limitations
		Shrink-swell (LEP >6)	1.00	
		MH or CH Unified and PI <40%	0.50	
Hicksville silt loam--------	20	Limitations		Limitations
		Shrink-swell (LEP 3-6)	0.50	Permeability .6-2"/h[...]
401:				
Peters silty clay loam------	60	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2[...]
		Shrink-swell (LEP >6)	1.00	Slopes 2 to 7%
		MH or CH Unified and PI <40%	0.50	
Pentz loam------------------	25	Limitations		Limitations
		Thin layer	1.00	Permeability > 2"/hr
		High piping potential	0.99	Depth to bedrock < 2[...]
				Slopes 2 to 7%
451:				
Pentz silt loam-------------	65	Limitations		Limitations
		Thin layer	1.00	Permeability > 2"/hr
		High piping potential	0.99	Depth to bedrock < 2[...]
		Shrink-swell (LEP 3-6)	0.02	Slopes > 7%
Peters silty clay loam------	35	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2[...]
		Shrink-swell (LEP >6)	1.00	Slopes 2 to 7%
		MH or CH Unified and PI <40%	0.50	

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees: Limitation	Embankments, dikes, and levees: Value	Pond reser: Limitati
452:				
Pentz silt loam	45	Limitations		Limitations
		Thin layer	1.00	Permeability > 2"/hr
		High piping potential	0.99	Depth to bedrock < 2
				Slopes > 7%
Peters silty clay loam	25	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
		Shrink-swell (LEP >6)	1.00	Slopes 2 to 7%
		MH or CH Unified and PI <40%	0.50	
Cometa sandy loam	15	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Permeability .6-2"/h
		Thin layer	0.11	Slopes 2 to 7%
475:				
Pentz silt loam	60	Limitations		Limitations
		Thin layer	1.00	Slopes > 7%
		High piping potential	0.99	Permeability > 2"/hr
				Depth to bedrock < 2
Peters silty clay loam	25	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
		Shrink-swell (LEP >6)	1.00	Slopes 2 to 7%
		MH or CH Unified and PI <40%	0.50	
551:				
Amador loam	85	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
		High piping potential	0.45	Slopes > 7%
				Permeability .6-2"/h
575:				
Amador loam	85	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
		High piping potential	0.24	Slopes > 7%
				Permeability .6-2"/h
751:				
Auburn silt loam	85	Limitations		Limitations
		Thin layer	1.00	Depth to bedrock < 2
		Very high piping potential	1.00	Permeability > 2"/hr
				Slopes > 7%

Table 13.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees: Limitation	Value	Pond reserv: Limitati
775:				
Auburn silt loam	85	Limitations		Limitations
		Thin layer	1.00	Slopes > 7%
		Very high piping potential	1.00	Depth to bedrock < 2
				Permeability > 2"/hr
851:				
Mckeonhills clay	85	Limitations		Limitations
		Shrink-swell (LEP >6)	1.00	Slopes > 7%
		MH or CH Unified and PI ≥40%	1.00	
		Thin layer	0.52	
999:				
Water	100	Not rated		Not rated

The interpretation for *embankments, dikes, and levees* evaluates the following soil properti in the soil: ponding; wetness; depth to a restrictive layer; rock fragments greater than 3 inche Unified classes for high organic content (PT, OL, or OH); Unified classes that are hard to pack permeability that is too rapid, allowing seepage; piping as determined by Atterberg limits of li plasticity index (PI); sodium content (SAR); and gypsum content.

The interpretation for *pond reservoir areas* evaluates the following soil properties at vary soil: slope, depth to hard or soft bedrock, depth to a cemented pan, marly textures, gypsum cont that is too rapid, allowing seepage.

Table 14.--Engineering Properties

[Absence of an entry indicates that the data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
100:									
Capay clay------------------	0-20	Clay loam, clay	CL, CH	A-7-6	0	0	100	100	86-100
	20-40	Clay loam, silty clay loam, clay, silty clay	CL, CH	A-7-6	0	0	100	100	86-100
	40-60	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	87-100
102:									
Alamo clay------------------	0-10	Clay	CH	A-7-6	0	0	100	100	82-100
	10-34	Clay	CL, CH	A-7-6	0	0	100	100	83-100
	34-60	Indurated	---	---	---	---	---	---	---
106:									
Archerdale, overwash--------	0-10	Very fine sandy loam	ML, CL-ML	A-4	0	0	100	95-100	91-100
	10-30	Clay loam, clay	CH	A-7-6, A-7-5	0	0	100	100	84-99
	30-60	Clay loam, clay	CH	A-7-6	0	0	100	100	85-100
107:									
Archerdale clay loam--------	0-10	Clay loam	CL, CH	A-7-6, A-6	0	0	100	100	87-97
	10-30	Silty clay loam, clay	CH	A-7-6, A-7-5	0	0	100	100	87-100
	30-60	Clay, silty clay loam	CH	A-7-6	0	0	100	100	87-100
127:									
Chuloak sandy loam----------	0-12	Sandy loam	SC-SM, SC	A-4, A-2-4	0	0	87-100	66-100	48-82
	12-38	Sandy clay loam, loam	SC, CL	A-6	0	0	86-100	65-100	56-92
	38-60	Fine sandy loam, loamy coarse sand, sandy loam	SC-SM, SM	A-4, A-2-4	0	0	95-100	81-100	59-82

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passi[ng] sieve number--: 4	10	40
	In				Pct	Pct			
128:									
Cogna loam-----------------	0-25	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100
	25-38	Silt loam, loam, clay loam	CL	A-7-6, A-6	0	0	100	100	97-100
	38-64	Clay loam, loam, silt loam	CL	A-6, A-7-6	0	0	100	100	96-100
129:									
Cogna loam-----------------	0-25	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100
	25-38	Clay loam, loam, silt loam	CL	A-7-6, A-6	0	0	100	100	97-100
	38-64	Loam, silt loam, clay loam	CL	A-6, A-7-6	0	0	100	100	96-100
130:									
Columbia, rarely flooded----	0-13	Sandy loam	SC, SC-SM, SM	A-4, A-2-4	0	0	100	95-100	68-82
	13-60	Stratified sand, stratified loam, stratified clay, stratified silt loam	SC, CL	A-6, A-7-6	0	0	100	95-100	69-100
131:									
Columbia, occasionally flooded-------------------	0-13	Sandy loam	SC-SM, SM, SC	A-4, A-2-4	0	0	100	95-100	68-82
	13-60	Stratified loamy sand, stratified clay loam, stratified silty clay, stratified silt loam	CL, CH	A-6, A-7-6	0	0	100	95-100	80-100

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				*Pct*	*Pct*			
134:									
Cometa sandy loam-----------	0-15	Sandy loam	SC-SM, SC	A-2-4, A-4	0	0	95-100	81-100	59-83
	15-40	Sandy clay, clay, clay loam	CL, CH	A-7-6	0	0	95-100	89-100	80-100
	40-60	Sandy loam	SC-SM	A-4, A-6	0	0	100	100	72-82
142:									
Delhi loamy sand------------	0-20	Loamy sand, fine sand	SM, SC-SM	A-2-4, A-4	0	0	100	100	73-88
	20-60	Loamy sand, fine sand, sand	SC-SM, SM	A-4, A-2-4	0	0	100	100	73-88
151:									
Mine dredge tailings--------	0-60	Fragmental material	GP	A-1-a	---	50-90	10-30	5-15	0-5
Riverwash-------------------	0-6	Gravelly sand	GW-GM	A-1-a	---	0-5	50-80	50-75	15-45
	6-60	Stratified extremely gravelly coarse sand to gravelly sand	GW	A-1	---	0-25	25-55	25-50	10-30
157:									
Exeter sandy clay loam------	0-12	Sandy clay loam, sandy loam	SC-SM, SC	A-4, A-2-4	0	0	95-100	81-100	59-82
	12-36	Sandy clay loam, loam, clay loam, sandy loam	CL, SC	A-6, A-7-6	0	0	95-100	81-100	69-95
	36-60	Cemented indurated	---	---	---	---	---	---	---
158:									
Finrod clay-----------------	0-25	Clay	CH	A-7-6	0	0	100	100	90-100
	25-40	Clay loam, clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	87-100
	40-60	Cemented	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				*Pct*	*Pct*			
170:									
Hicksville loam-------------	0-10	Gravelly loam, loam	SC, CL	A-6, A-2-6	0	0	74-97	43-84	37-79
	10-45	Gravelly clay loam, gravelly sandy clay loam	CL, SC	A-2-7, A-7-6	0	0	73-97	43-83	35-76
	45-60	Stratified very gravelly sandy clay loam, stratified very gravelly sandy loam, stratified very gravelly loamy sand, stratified sandy loam, stratified clay loam	SC-SM, SM, SC	A-2-4, A-4	0	0-3	70-94	28-68	19-62
172:									
Hicksville gravelly loam----	0-10	Gravelly loam	SC, CL	A-7-6, A-2-7	0	0	74-97	43-84	37-79
	10-45	Gravelly clay loam, gravelly sandy clay loam	CL, SC	A-2-7, A-7-6	0	0	73-97	43-83	35-76
	45-60	Stratified very gravelly sandy clay loam, stratified very gravelly sandy loam, stratified very gravelly loamy sand, stratified sandy loam, stratified clay loam	SC-SM, SM, SC	A-2-4, A-4	0	0-3	70-94	28-68	19-62

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
174:									
Hollenbeck silty clay-------	0-10	Clay, silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	72-100
	10-37	Clay, silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	72-100
	37-42	Silty clay loam, clay loam	ML	A-7-6, A-6	0	0	100	100	94-100
	42-60	Cemented indurated	---	---	---	---	---	---	---
175:									
Honcut sandy loam-----------	0-14	Sandy loam	SM, SC-SM	A-2-4, A-4	0	0	87-100	66-100	50-80
	14-60	Coarse sandy loam, sandy loam	SM, SC-SM	A-4, A-2-4	0	0	87-100	67-100	40-67
176:									
Honcut fine sandy loam------	0-14	Fine sandy loam	SM, SC-SM	A-4, A-2-4	0	0	87-100	66-100	59-94
	14-60	Coarse sandy loam, sandy loam	SC-SM, SM	A-4, A-2-4	0	0	87-100	67-100	40-67
177:									
Honcut gravelly sandy loam--	0-14	Gravelly sandy loam	SM, SC-SM	A-2-4	0	0	81-100	56-84	41-67
	14-60	Gravelly coarse sandy loam, gravelly sandy loam	SC-SM, SM	A-2-4	0	0	81-100	56-84	33-55
183:									
Jahant loam----------------	0-14	Loam	ML	A-6	0	0	86-100	69-100	58-94
	14-31	Loam, clay loam	CL	A-6, A-7-6	0	0	86-100	69-100	59-95
	31-49	Clay, clay loam	CH, CL	A-7-6	0	0	90-100	74-100	59-100
	49-60	Cemented indurated	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
187:									
Keyes gravelly loam---------	0-10	Gravelly loam	GC-GM, SC-SM	A-6	0	0-7	77-90	61-87	52-81
	10-19	Clay, clay loam	CH, SC	A-7	0	0-8	86-100	69-91	58-91
	19-34	Cemented indurated	---	---	---	---	---	---	---
	34-60	Weathered bedrock	---	---	---	---	---	---	---
Bellota sandy loam----------	0-9	Loam, sandy loam	SC-SM	A-4	0	0	89-100	68-91	50-75
	9-23	Gravelly sandy clay loam, cobbly clay loam, cobbly sandy clay loam	SC	A-2, A-6	0	0-7	76-86	64-79	52-72
	23-35	Clay	CH, CL	A-7	0	0	84-100	64-98	53-98
	35-37	Cemented indurated, cemented	---	---	---	---	---	---	---
	37-60	Weathered bedrock	---	---	---	---	---	---	---
188:									
Keyes gravelly loam---------	0-10	Gravelly loam	GC-GM, SC-SM	A-6	0	0-7	77-90	61-87	52-81
	10-19	Clay, gravelly clay loam	CH, SC	A-7-6	0	0-9	86-100	68-91	57-91
	19-34	Cemented indurated	---	---	---	---	---	---	---
	34-60	Weathered bedrock	---	---	---	---	---	---	---
Redding gravelly loam-------	0-13	Gravelly loam, gravelly sandy loam, loam	GC-GM, SC	A-4, A-6	0	0-10	73-95	38-87	31-79
	13-22	Clay, clay loam, gravelly clay, gravelly clay loam	CH, CL	A-7	0	0	84-100	64-94	48-93
	22-60	Cemented indurated	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
193:									
Madera sandy loam-----------	0-10	Sandy loam, loam	SM, SC-SM	A-4, A-2-4	0	0	95-100	90-100	65-82
	10-19	Sandy clay loam	SC, CL	A-6, A-7-6	0	0	95-100	90-100	73-92
	19-24	Clay, sandy clay, clay loam	CH, CL	A-7-6	0	0	100	94-100	80-100
	24-60	Cemented indurated	---	---	---	---	---	---	---
195:									
Clear Lake clay-------------	0-10	Clay	CH	A-7-6	0	0	100	100	82-100
	10-63	Clay, silty clay	CH, CL	A-7-6	0	0	100	100	82-100
201:									
Nord loam-------------------	0-25	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	84-92
	25-50	Loam, sandy loam, fine sandy loam	CL-ML, CL	A-4, A-6	0	0	100	100	84-92
	50-60	Loam, sandy loam, fine sandy loam	CL, CL-ML	A-6, A-4	0	0	100	100	84-92
202:									
Pardee gravelly loam--------	0-6	Gravelly loam, cobbly loam	SC, SC-SM, SM	A-4, A-2-4	0	0-4	77-92	42-75	34-69
	6-11	Very gravelly clay loam, very cobbly loam, very gravelly loam	SC, CL	A-2-7, A-7-6	0	0-7	65-90	26-76	23-74
	11-60	Unweathered bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				*Pct*	*Pct*			
206:									
Pentz fine sandy loam-------	0-9	Loam, fine sandy loam, silt loam	SC-SM, SM, SC	A-6, A-4	0	0-7	86-100	65-100	65-100
	9-12	Loam, fine sandy loam, silt loam	SC-SM, SC	A-6, A-4	0	0-7	86-100	65-100	62-100
	12-16	Fine sandy loam, loam, silt loam	SC-SM, SM	A-6, A-4	0	0-7	86-100	64-100	63-100
	16-60	Weathered bedrock	---	---	---	---	---	---	---
207:									
Pentz fine sandy loam-------	0-9	Sandy loam, fine sandy loam	SC-SM, SM, SC	A-2-4, A-4	0	0-7	86-100	65-100	57-98
	9-12	Sandy loam, fine sandy loam	SC-SM, SC	A-2-4, A-4	0	0-7	86-100	65-100	57-98
	12-16	Fine sandy loam, sandy loam	SC-SM, SM	A-2-6, A-6	0	0-7	86-100	64-100	57-99
	16-60	Weathered bedrock	---	---	---	---	---	---	---
209:									
Pentz loam-----------------	0-7	Loam, fine sandy loam, silt loam	SC-SM, SM, SC	A-6, A-4	0	0-7	86-100	65-100	65-100
	7-14	Loam, fine sandy loam, silt loam	SC-SM, SC	A-6, A-4	0	0-7	86-100	65-100	62-100
	14-60	Weathered bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
209:									
Bellota loam----------------	0-9	Sandy loam, loam	SC-SM	A-4	0	0	89-100	68-91	50-75
	9-23	Gravelly sandy clay loam, cobbly clay loam, cobbly sandy clay loam	SC	A-2, A-6	0	0-7	76-86	64-79	52-72
	23-35	Clay	CH, CL	A-7	0	0	84-100	64-98	53-98
	35-37	Cemented indurated, cemented	---	---	---	---	---	---	---
	37-60	Weathered bedrock	---	---	---	---	---	---	---
210:									
Pentz loam------------------	0-9	Loam, fine sandy loam, silt loam	SC-SM, SM, SC	A-4, A-6	0	0-7	86-100	65-100	65-100
	9-12	Loam, fine sandy loam, silt loam	SC-SM, SC	A-6, A-4	0	0-7	86-100	65-100	62-100
	12-16	Fine sandy loam, loam, silt loam	SC-SM, SM	A-4, A-6	0	0-7	86-100	64-100	63-100
	16-60	Weathered bedrock	---	---	---	---	---	---	---
Redding gravelly loam-------	0-17	Loam, gravelly loam	CL, CL-ML, SC, SC-SM	A-6, A-2-6	0	0	75-100	36-98	29-92
	17-25	Clay loam, clay	CH, SC	A-7	0	0	84-100	64-98	48-97
	25-60	Cemented indurated	---	---	---	---	---	---	---
212:									
Peters clay-----------------	0-6	Clay, clay loam, silty clay loam, silty clay	CH	A-7-6	0	0-3	93-100	82-100	71-100
	6-16	Clay, silty clay	CH	A-7-6	0	0-5	89-100	78-100	66-100
	16-60	Weathered bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
219:									
Redding loam----------------	0-13	Gravelly loam, loam	SC, SC-SM, CL-ML, CL	A-4, A-6	0	0	75-100	36-98	29-94
	13-22	Clay loam, clay	CH, SC	A-7-6	0	0	84-100	64-98	51-98
	22-60	Cemented indurated	---	---	---	---	---	---	---
220:									
Redding gravelly loam-------	0-5	Gravelly loam, loam	CL, SC	A-4, A-2-4	0	0	64-90	31-90	26-90
	5-17	Gravelly loam, loam	CL, SC	A-6, A-2-6	0	0	76-100	39-98	32-97
	17-22	Clay, clay loam	CH, SC	A-7-6	0	0	82-94	65-94	49-94
	22-60	Cemented indurated	---	---	---	---	---	---	---
221:									
Redding gravelly loam-------	0-13	Gravelly sandy loam, cobbly loam, gravelly loam	CL, SC	A-6, A-2-6	0	0-19	70-95	34-87	27-83
	13-22	Clay, gravelly clay loam, gravelly clay	CH, SC	A-7-6, A-2-7	0	0	74-98	34-92	27-92
	22-60	Cemented indurated	---	---	---	---	---	---	---
236:									
San Joaquin sandy loam------	0-11	Sandy loam	SC, SC-SM	A-4, A-2-4	0	0	95-100	86-100	62-82
	11-24	Clay loam, clay	CH	A-7-6	0	0	95-100	89-100	77-100
	24-60	Cemented indurated			---	---	---	---	---
237:									
San Joaquin sandy loam------	0-11	Sandy loam	SC, SC-SM	A-4, A-2-4	0	0	95-100	86-100	62-82
	11-24	Clay loam, clay	CL	A-7-6	0	0	95-100	89-100	77-100
	24-60	Cemented indurated			---	---	---	---	---
241:									
San Joaquin sandy loam------	0-11	Loam	SC, SC-SM	A-4, A-6	0	0	95-100	85-100	70-92
	11-24	Clay loam, clay	CH	A-7-6	0	0	95-100	89-100	77-100
	24-60	Cemented indurated	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40
	In				Pct	Pct			
241:									
San Joaquin, thick surface--	0-15	Sandy loam	SC, SC-SM	A-4, A-2-4	0	0	95-100	86-100	62-82
	15-25	Sandy clay loam	SC, CL	A-6	0	0	95-100	90-100	73-92
	25-38	Clay loam, clay	CL, CH	A-7-6	0	0	95-100	89-100	71-95
	38-60	Cemented indurated	---	---	---	---	---	---	---
266:									
Veritas fine sandy loam-----	0-16	Fine sandy loam, sandy loam	SC-SM, SM	A-4, A-2-4	0	0	100	90-100	77-97
	16-47	Sandy loam, fine sandy loam	SC-SM, SM	A-4, A-2-4	0	0	100	90-100	77-97
	47-60	Indurated	---	---	---	---	---	---	---
285:									
Peters clay-----------------	0-6	Clay, clay loam, silty clay loam, silty clay	CH	A-7-6	0	0-3	93-100	82-100	71-100
	6-16	Clay, silty clay	CH	A-7-6	0	0-5	89-100	78-100	66-100
	16-60	Weathered bedrock	---	---	---	---	---	---	---
301:									
Archerdale clay loam--------	0-10	Clay loam	CL, CH	A-7-6, A-6	0	0	100	100	87-97
	10-30	Silty clay loam, clay	CH	A-7-6, A-7-5	0	0	100	100	87-100
	30-60	Clay, silty clay loam	CH	A-7-6	0	0	100	100	87-100

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
301:									
Hicksville silt loam--------	0-10	Gravelly loam, loam, silt loam	SC, CL	A-6, A-2-6	0	0	74-97	43-84	37-79
	10-45	Gravelly clay loam, gravelly sandy clay loam	CL, SC	A-2-7, A-7-6	0	0	73-97	43-83	35-76
	45-60	Stratified very gravelly sandy clay loam, stratified very gravelly sandy loam, stratified very gravelly loamy sand, stratified sandy loam, stratified clay loam	SC-SM, SM, SC	A-2-4, A-4	0	0-3	70-94	28-68	19-62
401:									
Peters silty clay loam------	0-2	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-7	0	0-5	94-100	88-100	84-100
	2-6	Silty clay, clay	CH	A-7	0	0-3	94-100	83-100	81-100
	6-14	Silty clay, clay	CH	A-7	0	0-3	95-100	84-100	81-100
	14-15	---	---	---	---	---	---	---	---
	15-60	Weathered bedrock	---	---	---	---	---	---	---
Pentz loam-----------------	0-9	Loam, fine sandy loam, silt loam	SC-SM, SM, SC	A-4, A-6	0	0-8	84-100	59-100	59-100
	9-12	Loam, fine sandy loam, silt loam	SC-SM, SC	A-6, A-4	0	0-7	85-100	62-100	59-100
	12-16	Fine sandy loam, loam, silt loam	SC-SM	A-4, A-6	0	0-7	85-100	62-100	60-100
	16-60	Weathered bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
451:									
Pentz silt loam------------	0-6	Loam, fine sandy loam, silt loam	SC-SM, SM, SC	A-4, A-6	0	0-8	84-100	59-100	59-100
	6-10	Loam, fine sandy loam, silt loam	SC-SM, SC	A-6, A-4	0	0-7	85-100	62-100	59-100
	10-12	Fine sandy loam, loam, silt loam	SC-SM	A-4, A-6	0	0-7	85-100	62-100	60-100
	12-60	Weathered bedrock	---	---	---	---	---	---	---
Peters silty clay loam------	0-2	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-7	0	0-5	94-100	88-100	84-100
	2-6	Silty clay, clay	CH	A-7	0	0-3	94-100	83-100	81-100
	6-14	Silty clay, clay	CH	A-7	0	0-3	95-100	84-100	81-100
	14-15	---	---	---	---	---	---	---	---
	15-60	Weathered bedrock	---	---	---	---	---	---	---
452:									
Pentz silt loam------------	0-9	Loam, fine sandy loam, silt loam	SC-SM, SM, SC	A-4, A-6	0	0-8	84-100	59-100	59-100
	9-12	Loam, fine sandy loam, silt loam	SC-SM, SC	A-6, A-4	0	0-7	85-100	62-100	59-100
	12-16	Fine sandy loam, loam, silt loam	SC-SM	A-4, A-6	0	0-7	85-100	62-100	60-100
	16-60	Weathered bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
452:									
Peters silty clay loam------	0-2	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-7	0	0-5	94-100	88-100	84-10
	2-6	Silty clay, clay	CH	A-7	0	0-3	94-100	83-100	81-10
	6-14	Silty clay, clay	CH	A-7	0	0-3	95-100	84-100	81-10
	14-15	---	---	---	---	---	---	---	---
	15-60	Weathered bedrock	---	---	---	---	---	---	---
Cometa sandy loam-----------	0-15	Sandy loam	SC-SM, SC	A-2-4, A-4	0	0	95-100	81-100	59-83
	15-40	Sandy clay, clay, clay loam	CL, CH	A-7-6	0	0	95-100	89-100	80-10
	40-60	Sandy loam	SC-SM	A-4, A-6	0	0	100	100	72-82
475:									
Pentz silt loam-------------	0-9	Sandy loam, loam, fine sandy loam, gravelly sandy loam, silt loam	SC-SM, CL	A-6, A-4	0	0	74-98	72-98	63-95
	9-12	Loam, sandy loam, fine sandy loam, gravelly sandy loam, silt loam	CL, SC-SM	A-6, A-4	0	0	87-99	74-98	65-96
	12-16	Loam, sandy loam, sandy clay loam, silt loam	CL	A-6	0	0	76-98	74-98	65-96
	16-60	Weathered bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				Pct	Pct			
475:									
Peters silty clay loam------	0-2	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-7	0	0-5	94-100	88-100	84-100
	2-6	Silty clay, clay	CH	A-7	0	0-3	95-100	84-100	81-100
	6-14	Silty clay, clay	CH	A-7	0	0-3	95-100	84-100	81-100
	14-15	---	---	---	---	---	---	---	---
	15-60	Weathered bedrock	---	---	---	---	---	---	---
551:									
Amador loam----------------	0-4	Sandy loam, loam	SC, SC-SM	A-6, A-4	0	0	94-98	75-90	58-83
	4-15	Sandy loam, loam	CL, SC	A-6, A-4	0	0	94-98	78-97	61-90
	15-60	Weathered bedrock	---	---	---	---	---	---	---
575:									
Amador loam----------------	0-4	Sandy loam, loam	CL-ML, CL, SC-SM, SC	A-4, A-6	0	0	82-98	61-93	46-85
	4-16	Sandy loam, loam	CL-ML, CL, SC-SM	A-4, A-6	0	0	85-98	67-95	49-86
	16-60	Weathered bedrock	---	---	---	---	---	---	---
751:									
Auburn silt loam-----------	0-6	Silt loam, loam	SC-SM	A-4	0	0-9	84-100	83-100	75-100
	6-16	Gravelly silt loam, silt loam, gravelly fine sandy loam, loam	GC-GM, SC-SM	A-4	2-10	1-4	79-96	77-96	68-96
	16-60	Bedrock	---	---	---	---	---	---	---
775:									
Auburn silt loam-----------	0-6	Silt loam, loam	SC-SM	A-4	0	0-9	85-100	84-100	76-100
	6-16	Gravelly silt loam, silt loam, very gravelly silt loam, loam	CL-ML, SC-SM, CL	A-2-4, A-4	0	11-37	42-88	40-88	36-88
	16-60	Bedrock	---	---	---	---	---	---	---

Table 14.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passi sieve number--		
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40
	In				*Pct*	*Pct*			
851:									
Mckeonhills clay------------	0-4	Clay	CH	A-7-6	0	0	72-98	69-98	58-98
	4-19	Clay	CH	A-7-6	0	0	74-98	71-98	61-98
	19-39	Clay	CH, MH	A-7-6	0	0	74-98	72-98	61-98
	39-60	Weathered bedrock	---	---	---	---	---	---	---
999:									
Water.									

Table 15.--Physical Properties of the Soils

Map symbol and soil name	Depth	Clay	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter
	In	*Pct*	*µm/sec*	*In/in*	*Pct*	*Pct*
100:						
Capay clay	0-20	35-55	0.42-1.40	0.14-0.16	6.0-8.9	1.0-2.0
	20-40	35-55	0.42-1.40	0.14-0.16	6.0-8.9	0.2-1.0
	40-60	30-45	0.42-1.40	0.17-0.19	6.0-8.9	0.0-0.5
102:						
Alamo clay	0-10	40-60	0.42-1.40	0.13-0.16	6.0-8.9	0.5-4.0
	10-34	40-60	0.01-0.42	0.12-0.15	6.0-8.9	0.0-0.5
	34-60	---	0.00-0.01	---	---	---
106:						
Archerdale, overwash	0-10	5-10	4.00-14.00	0.14-0.17	6.0-8.9	1.0-2.0
	10-30	35-50	1.40-4.00	0.18-0.20	6.0-8.9	1.0-4.0
	30-60	35-50	0.42-1.40	0.14-0.16	6.0-8.9	1.0-2.0
107:						
Archerdale clay loam	0-10	30-40	4.00-14.00	0.14-0.17	0.0-2.9	1.0-4.0
	10-30	35-50	1.40-4.00	0.18-0.20	6.0-8.9	1.0-4.0
	30-60	35-50	0.42-1.40	0.14-0.16	6.0-8.9	1.0-2.0
127:						
Chuloak sandy loam	0-12	10-20	14.00-42.00	0.10-0.13	0.0-2.9	1.0-2.0
	12-38	18-25	1.40-4.00	0.15-0.18	3.0-5.9	0.0-0.5
	38-60	5-15	14.00-42.00	0.10-0.13	0.0-2.9	0.0-0.5
128:						
Cogna loam	0-25	8-18	14.00-42.00	0.13-0.15	0.0-2.9	0.5-1.0
	25-38	27-34	4.00-14.00	0.15-0.17	0.0-2.9	0.0-0.0
	38-64	20-26	4.00-14.00	0.14-0.19	3.0-5.9	0.0-0.0
129:						
Cogna loam	0-25	8-18	14.00-42.00	0.13-0.15	0.0-2.9	0.5-1.0
	25-38	27-34	4.00-14.00	0.15-0.17	0.0-2.9	0.0-0.0
	38-64	20-26	4.00-14.00	0.14-0.19	3.0-5.9	0.0-0.0
130:						
Columbia, rarely flooded	0-13	8-18	14.00-42.00	0.10-0.12	0.0-2.9	0.5-2.0
	13-60	5-42	14.00-42.00	0.08-0.11	0.0-2.9	0.0-2.0
131:						
Columbia, occasionally flooded	0-13	8-18	14.00-42.00	0.10-0.12	0.0-2.9	0.5-2.0
	13-60	10-45	14.00-42.00	0.08-0.11	0.0-2.9	0.0-2.0
134:						
Cometa sandy loam	0-15	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.5-2.0
	15-40	35-50	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	40-60	10-20	4.00-14.00	---	0.0-2.9	0.0-0.2
142:						
Delhi loamy sand	0-20	0-15	42.00-141.00	0.06-0.10	0.0-2.9	0.5-1.0
	20-60	0-15	42.00-141.00	0.06-0.10	0.0-2.9	0.0-0.5
151:						
Mine dredge tailings	0-60	0-1	42.00-141.00	0.01-0.02	0.0-2.9	0.0-0.1
Riverwash	0-6	0-1	42.00-141.00	0.03-0.04	0.0-2.9	0.0-0.1
	6-60	0-1	42.00-141.00	0.02-0.03	0.0-2.9	---

Table 15.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter
	In	Pct	µm/sec	In/in	Pct	Pct
157:						
Exeter sandy clay loam-------	0-12	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.0-1.0
	12-36	20-30	1.00-14.11	0.14-0.17	3.0-5.9	0.0-0.5
	36-60	---	0.00-0.01	---	---	---
158:						
Finrod clay------------------	0-25	40-50	0.42-1.40	0.14-0.16	6.0-8.9	1.0-3.0
	25-40	30-45	0.42-1.40	0.14-0.16	6.0-8.9	0.2-1.0
	40-60	---	0.00-0.01	---	---	---
170:						
Hicksville loam--------------	0-10	18-27	4.00-14.00	0.16-0.18	0.0-2.9	1.0-3.0
	10-45	27-35	1.40-4.00	0.17-0.20	3.0-5.9	0.2-1.0
	45-60	5-30	4.00-14.00	0.11-0.15	0.0-2.9	0.0-0.2
172:						
Hicksville gravelly loam-----	0-10	18-27	4.00-14.00	0.16-0.18	0.0-2.9	1.0-3.0
	10-45	27-35	1.40-4.00	0.17-0.20	3.0-5.9	0.2-1.0
	45-60	5-30	4.00-14.00	0.11-0.15	0.0-2.9	0.0-0.2
174:						
Hollenbeck silty clay--------	0-10	30-60	0.42-1.40	0.14-0.16	6.0-8.9	1.0-2.0
	10-37	30-60	0.42-1.40	0.14-0.16	6.0-8.9	1.0-2.0
	37-42	30-40	0.00-0.00	0.00-0.00	0.0-2.9	1.0-2.0
	42-60	---	---	---	---	---
175:						
Honcut sandy loam------------	0-14	7-12	14.00-42.00	0.10-0.12	0.0-2.9	0.5-1.0
	14-60	7-15	14.00-42.00	0.10-0.12	0.0-2.9	0.0-0.5
176:						
Honcut fine sandy loam-------	0-14	7-12	14.00-42.00	0.11-0.13	0.0-2.9	0.5-1.0
	14-60	7-15	14.00-42.00	0.10-0.12	0.0-2.9	0.0-0.5
177:						
Honcut gravelly sandy loam---	0-14	6-12	14.00-42.00	0.09-0.11	0.0-2.9	0.5-1.0
	14-60	6-12	14.00-42.00	0.08-0.11	0.0-2.9	0.0-0.5
183:						
Jahant loam------------------	0-14	15-25	4.00-14.00	0.13-0.15	0.0-2.9	1.0-3.0
	14-31	20-30	4.00-14.00	0.13-0.17	3.0-5.9	0.5-1.0
	31-49	35-60	0.01-0.42	0.08-0.10	6.0-8.9	0.0-0.5
	49-60	---	0.00-0.00	0.00-0.00	0.0-2.9	---
187:						
Keyes gravelly loam----------	0-10	18-26	4.00-14.00	0.10-0.13	0.0-2.9	0.0-2.0
	10-19	38-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.0
	19-34	---	0.00-0.00	0.00-0.00	0.0-2.9	---
	34-60	---	0.00-0.00	0.00-0.00	---	---
Bellota sandy loam-----------	0-9	12-20	14.00-42.00	0.11-0.13	0.0-2.9	0.0-2.0
	9-23	20-30	1.40-4.00	0.10-0.14	3.0-5.9	0.0-0.0
	23-35	40-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.0
	35-37	---	0.00-0.00	0.00-0.00	0.0-2.9	---
	37-60	---	0.00-0.01	0.00-0.00	---	---
188:						
Keyes gravelly loam----------	0-10	18-27	4.00-14.00	0.10-0.13	0.0-2.9	0.0-2.0
	10-19	35-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.0
	19-34	---	0.00-0.00	0.00-0.00	0.0-2.9	---
	34-60	---	0.00-0.00	0.00-0.00	---	---

Table 15.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter
	In	*Pct*	*µm/sec*	*In/in*	*Pct*	*Pct*
188:						
Redding gravelly loam--------	0-13	8-18	4.00-14.00	0.10-0.14	0.0-2.9	0.5-2.0
	13-22	35-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	22-60	---	0.00-0.00	0.00-0.00	0.0-2.9	---
193:						
Madera sandy loam------------	0-10	5-15	14.00-42.00	0.09-0.13	0.0-2.9	0.5-1.0
	10-19	20-30	1.40-4.00	0.15-0.17	3.0-5.9	0.2-0.5
	19-24	35-50	0.01-0.42	0.04-0.08	6.0-8.9	0.0-0.2
	24-60	0-0	0.00-0.01	0.00-0.00	---	---
195:						
Clear Lake clay--------------	0-10	40-60	0.42-1.40	0.12-0.16	6.0-8.9	1.0-4.0
	10-63	40-60	0.42-1.40	0.12-0.16	6.0-8.9	0.1-1.0
201:						
Nord loam--------------------	0-25	10-18	4.00-14.00	0.13-0.15	0.0-2.9	1.0-2.0
	25-50	10-18	4.00-14.00	0.11-0.15	0.0-2.9	0.0-1.0
	50-60	10-18	4.00-14.00	0.11-0.15	0.0-2.9	0.0-1.0
202:						
Pardee gravelly loam---------	0-6	8-18	4.00-14.00	0.10-0.14	0.0-2.9	1.0-2.0
	6-11	24-38	1.40-4.00	0.08-0.11	0.0-2.9	0.5-1.0
	11-60	---	1.40-4.00	---	---	---
206:						
Pentz fine sandy loam--------	0-9	8-18	14.00-42.00	0.11-0.13	0.0-2.9	1.0-3.0
	9-12	10-20	14.00-42.00	0.11-0.15	0.0-2.9	0.2-1.0
	12-16	12-22	14.00-42.00	0.11-0.15	0.0-2.9	0.0-0.2
	16-60	1-4	1.40-4.00	---	---	---
207:						
Pentz fine sandy loam--------	0-9	8-18	14.00-42.00	0.11-0.13	0.0-2.9	1.0-3.0
	9-12	10-20	14.00-42.00	0.11-0.15	0.0-2.9	0.2-1.0
	12-16	12-22	14.00-42.00	0.11-0.15	0.0-2.9	0.0-0.2
	16-60	---	1.40-4.00	---	---	---
209:						
Pentz loam-------------------	0-7	8-18	14.00-42.00	0.11-0.13	0.0-2.9	1.0-3.0
	7-14	10-20	14.00-42.00	0.11-0.15	0.0-2.9	0.2-1.0
	14-60	1-4	1.40-4.00	---	---	---
Bellota loam-----------------	0-9	12-20	14.00-42.00	0.11-0.13	0.0-2.9	0.0-2.0
	9-23	20-30	1.40-4.00	0.10-0.14	3.0-5.9	0.0-0.0
	23-35	40-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.0
	35-37	---	0.00-0.00	0.00-0.00	0.0-2.9	---
	37-60	---	0.00-0.01	0.00-0.00	---	---
210:						
Pentz loam-------------------	0-9	8-18	14.00-42.00	0.11-0.13	0.0-2.9	1.0-3.0
	9-12	10-20	14.00-42.00	0.11-0.15	0.0-2.9	0.2-1.0
	12-16	12-22	14.00-42.00	0.11-0.15	0.0-2.9	0.0-0.2
	16-60	1-4	1.40-4.00	---	---	---
Redding gravelly loam--------	0-17	12-25	4.00-14.00	0.10-0.14	0.0-2.9	0.5-2.0
	17-25	35-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	25-60	---	0.00-0.01	---	---	---
212:						
Peters clay------------------	0-6	35-50	0.42-1.40	0.14-0.16	6.0-8.9	1.0-3.5
	6-16	40-60	0.42-1.40	0.12-0.16	6.0-8.9	1.0-3.0
	16-60	---	1.40-4.00	---	---	---

Table 15.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter
	In	*Pct*	*µm/sec*	*In/in*	*Pct*	*Pct*
219:						
Redding loam-----------------	0-13	10-25	4.00-14.00	0.14-0.16	0.0-2.9	0.5-2.0
	13-22	35-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	22-60	---	0.00-0.01	---	---	---
220:						
Redding gravelly loam--------	0-5	10-25	4.00-14.00	0.10-0.14	1.0-3.0	1.5-4.0
	5-17	10-25	4.00-14.00	0.10-0.14	0.5-2.5	0.5-1.5
	17-22	35-60	0.01-0.42	0.04-0.06	4.5-6.5	0.1-0.5
	22-60	---	0.00-0.01	---	---	---
221:						
Redding gravelly loam--------	0-13	10-25	4.00-14.00	0.10-0.14	0.0-2.9	0.5-2.0
	13-22	35-60	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	22-60	---	0.00-0.01	---	---	---
236:						
San Joaquin sandy loam-------	0-11	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.5-1.0
	11-24	35-50	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	24-60	0-0	0.00-0.01	---	---	---
237:						
San Joaquin sandy loam-------	0-11	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.5-1.0
	11-24	35-50	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	24-60	0-0	0.00-0.01	---	---	---
241:						
San Joaquin sandy loam-------	0-11	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.5-1.0
	11-24	35-50	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	24-60	0-0	0.00-0.01	---	---	---
San Joaquin, thick surface---	0-15	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.5-1.0
	15-25	20-30	1.40-4.00	0.16-0.17	0.0-2.9	0.0-0.5
	25-38	35-50	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	38-60	0-0	0.00-0.01	---	---	---
266:						
Veritas fine sandy loam------	0-16	5-16	14.00-42.00	0.12-0.15	0.0-2.9	1.0-2.0
	16-47	5-16	14.00-42.00	0.12-0.15	0.0-2.9	0.0-0.5
	47-60	---	0.00-0.01	---	---	---
285:						
Peters clay------------------	0-6	35-50	0.42-1.40	0.14-0.16	6.0-8.9	1.0-3.5
	6-16	40-60	0.42-1.40	0.12-0.16	6.0-8.9	1.0-3.0
	16-60	---	1.40-4.00	---	---	---
301:						
Archerdale clay loam---------	0-10	30-40	4.00-14.00	0.14-0.17	0.0-2.9	1.0-4.0
	10-30	35-50	1.40-4.00	0.18-0.20	6.0-8.9	1.0-4.0
	30-60	35-50	0.42-1.40	0.14-0.16	6.0-8.9	1.0-2.0
Hicksville silt loam---------	0-10	18-27	4.00-14.00	0.16-0.18	0.0-2.9	1.0-3.0
	10-45	27-35	1.40-4.00	0.17-0.20	3.0-5.9	0.2-1.0
	45-60	5-30	4.00-14.00	0.11-0.15	0.0-2.9	0.0-0.2
401:						
Peters silty clay loam-------	0-2	35-40	0.42-1.40	0.14-0.16	4.0-7.0	1.5-4.0
	2-6	40-45	0.42-1.40	0.12-0.16	7.5-11.0	1.3-1.5
	6-14	40-45	0.42-1.40	0.12-0.16	9.0-12.5	1.0-1.3
	14-15	30-40	0.80-2.00	---	---	---
	15-60	15-20	1.40-4.00	---	---	---

Table 15.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter
	In	*Pct*	*µm/sec*	*In/in*	*Pct*	*Pct*
401:						
Pentz loam-------------------	0-9	8-18	14.00-42.00	0.11-0.13	0.5-6.0	1.5-2.5
	9-12	10-20	14.00-42.00	0.11-0.15	1.0-6.5	0.9-1.5
	12-16	12-22	14.00-42.00	0.11-0.15	1.5-7.0	0.5-0.9
	16-60	1-4	1.40-4.00	---	---	---
451:						
Pentz silt loam--------------	0-6	8-18	14.00-42.00	0.11-0.13	0.5-6.0	1.5-2.5
	6-10	10-20	14.00-42.00	0.11-0.15	1.0-6.5	0.9-1.5
	10-12	12-22	14.00-42.00	0.11-0.15	1.5-7.0	0.5-0.9
	12-60	1-4	1.40-4.00	---	---	---
Peters silty clay loam-------	0-2	35-40	0.42-1.40	0.14-0.16	4.0-7.0	1.5-4.0
	2-6	40-45	0.42-1.40	0.12-0.16	7.5-11.0	1.3-1.5
	6-14	40-45	0.42-1.40	0.12-0.16	9.0-12.5	1.0-1.3
	14-15	30-40	0.80-2.00	---	---	---
	15-60	15-20	1.40-4.00	---	---	---
452:						
Pentz silt loam--------------	0-9	8-18	14.00-42.00	0.11-0.13	0.5-6.0	1.5-2.5
	9-12	10-20	14.00-42.00	0.11-0.15	1.0-6.5	0.9-1.5
	12-16	12-22	14.00-42.00	0.11-0.15	1.5-7.0	0.5-0.9
	16-60	1-4	1.40-4.00	---	---	---
Peters silty clay loam-------	0-2	35-40	0.42-1.40	0.14-0.16	4.0-7.0	1.5-4.0
	2-6	40-45	0.42-1.40	0.12-0.16	7.5-11.0	1.3-1.5
	6-14	40-45	0.42-1.40	0.12-0.16	9.0-12.5	1.0-1.3
	14-15	30-40	0.80-2.00	---	---	---
	15-60	15-20	1.40-4.00	---	---	---
Cometa sandy loam------------	0-15	10-20	4.00-14.00	0.10-0.13	0.0-2.9	0.5-2.0
	15-40	35-50	0.01-0.42	0.04-0.06	6.0-8.9	0.0-0.5
	40-60	---	0.00-0.22	---	---	---
475:						
Pentz silt loam--------------	0-9	8-18	14.00-42.00	0.11-0.13	0.5-6.0	1.5-2.5
	9-12	10-20	14.00-42.00	0.11-0.15	1.0-6.5	0.9-1.5
	12-16	12-22	14.00-42.00	0.11-0.15	1.5-7.0	0.5-0.9
	16-60	1-4	1.40-4.00	---	---	---
Peters silty clay loam-------	0-2	35-40	0.42-1.40	0.14-0.16	4.0-7.0	1.5-4.0
	2-6	40-45	0.42-1.40	0.12-0.16	7.5-11.0	1.3-1.5
	6-14	40-45	0.42-1.40	0.12-0.16	9.0-12.5	1.0-1.3
	14-15	30-40	0.80-2.00	---	---	---
	15-60	15-20	1.40-4.00	---	---	---
551:						
Amador loam------------------	0-4	10-25	4.00-14.00	0.14-0.16	0.5-3.5	1.0-5.0
	4-15	13-28	4.00-14.00	0.13-0.16	0.0-1.5	0.2-1.0
	15-60	---	1.40-4.00	---	---	---
575:						
Amador loam------------------	0-4	8-24	4.00-14.00	0.14-0.16	0.5-3.5	1.0-5.0
	4-16	8-26	4.00-14.00	0.13-0.16	0.2-1.5	0.2-1.0
	16-60	---	1.40-4.00	---	---	---
751:						
Auburn silt loam-------------	0-6	10-25	4.00-14.00	0.14-0.17	1.0-4.0	0.6-2.5
	6-16	10-25	4.00-14.00	0.14-0.17	0.5-3.5	0.0-0.6
	16-60	---	0.07-140.00	---	---	---

Table 15.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter
	In	*Pct*	*µm/sec*	*In/in*	*Pct*	*Pct*
775:						
Auburn silt loam-------------	0-6	10-25	4.00-14.00	0.14-0.17	1.0-4.0	1.0-2.5
	6-16	10-25	4.00-14.00	0.14-0.17	0.5-3.5	0.0-1.0
	16-60	---	0.07-140.00	---	---	---
851:						
Mckeonhills clay-------------	0-4	45-65	0.42-1.40	0.13-0.16	11.0-18.0	2.0-3.0
	4-19	45-65	0.42-1.40	0.12-0.15	11.0-18.0	2.5-3.5
	19-39	45-65	0.42-1.40	0.12-0.15	10.0-16.0	2.0-3.0
	39-60	---	0.42-4.00	---	---	---
999:						
Water.						

Table 16.--Chemical Properties of the Soils

[Soil properties are measured or inferred from direct observations in the field or laboratory. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100g*	*pH*	*Pct*	*Pct*	*dS/m*	
100:							
Capay clay------------------	0-51	23-42	5.6-8.4	0-2	0	0.0-2.0	1-5
	51-102	13-34	6.6-8.4	1-5	0	0.0-2.0	2-10
	102-152	5.0-23	6.6-8.4	1-5	0	0.0-2.0	2-10
102:							
Alamo clay------------------	0-25	20-57	6.1-7.8	0	0	0	0
	25-86	7.0-29	6.1-8.4	0	0	0.0-2.0	0
	86-152	---	---	---	---	---	---
106:							
Archerdale, overwash--------	0-25	5.0-9.0	6.1-7.3	0	0	0	0
	25-76	28-40	6.6-7.3	0	0	0	0
	76-152	28-39	6.6-7.3	0	0	0	0
107:							
Archerdale clay loam--------	0-25	24-33	6.1-7.3	0	0	0	0
	25-76	28-40	6.6-7.3	0	0	0	0
	76-152	28-39	6.6-7.3	0	0	0	0
127:							
Chuloak sandy loam----------	0-30	9.0-17	5.6-6.5	0	0	0.0-2.0	0
	30-97	13-20	6.1-7.3	0	0	0.0-2.0	0
	97-152	4.0-13	6.1-7.3	0	0	0.0-2.0	0
128:							
Cogna loam------------------	0-63	7.0-15	6.1-6.5	0	0	0.0-2.0	0
	63-97	19-23	6.1-6.5	0	0	0.0-2.0	0
	97-163	14-18	7.4-9.0	1-2	0	0.0-2.0	0
129:							
Cogna loam------------------	0-63	7.0-15	6.1-6.5	0	0	0.0-2.0	0
	63-97	19-23	6.1-6.5	0	0	0.0-2.0	0
	97-163	14-18	7.4-9.0	1-2	0	0.0-2.0	0
130:							
Columbia, rarely flooded----	0-33	7.0-16	6.1-7.8	0	0	0	0
	33-152	4.0-33	6.1-7.8	0	0	0	0
131:							
Columbia, occasionally flooded--------------------	0-33	7.0-16	6.1-7.8	0	0	0	0
	33-152	7.0-35	6.1-7.8	0	0	0	0
134:							
Cometa sandy loam-----------	0-38	8.6-17	5.6-6.5	0	0	0	0
	38-102	23-37	6.1-7.3	0	0	0	0
	102-152	7.6-16	6.6-7.3	0	0	0	0
142:							
Delhi loamy sand------------	0-51	0.0-11	6.1-7.8	0	0	0	0
	51-152	0.0-11	6.1-7.8	0	0	0	0
151:							
Mine dredge tailings--------	0-152	---	---	0	0	0	0
Riverwash-------------------	0-15	---	---	0	0	0	0
	15-152	---	---	0	0	0	0

Table 16.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100g*	*pH*	*Pct*	*Pct*	*dS/m*	
157:							
Exeter sandy clay loam------	0-30	8.0-17	6.1-8.4	0	0	0.0-2.0	0
	30-91	14-23	6.6-8.4	0	0	0.0-2.0	0
	91-152	---	---	---	---	---	---
158:							
Finrod clay-----------------	0-64	31-40	6.6-7.3	0	0	0	0
	64-102	23-35	6.6-8.4	0	0	0	0
	102-152	---	---	---	---	---	---
170:							
Hicksville loam-------------	0-25	15-23	5.6-6.5	0	0	0	0
	25-114	21-28	6.1-7.8	0	0	0	0
	114-152	4.0-23	6.1-7.8	0	0	0	0
172:							
Hicksville gravelly loam----	0-25	15-23	5.6-6.5	0	0	0	0
	25-114	21-28	6.1-7.8	0	0	0	0
	114-152	4.0-23	6.1-7.8	0	0	0	0
174:							
Hollenbeck silty clay-------	0-25	33-48	6.6-7.3	2-5	0	0.0-2.0	0
	25-94	33-48	6.6-7.8	2-5	0	0.0-2.0	0
	94-107	33-48	7.9-8.4	5-9	0	1.0-3.0	0
	107-152	---	---	---	---	---	---
175:							
Honcut sandy loam-----------	0-36	6.0-11	5.6-7.3	0	0	0	0
	36-152	6.0-13	6.1-8.4	0	0	0.0-2.0	0
176:							
Honcut fine sandy loam------	0-36	6.0-11	5.6-7.3	0	0	0	0
	36-152	6.0-13	6.1-8.4	0	0	0.0-2.0	0
177:							
Honcut gravelly sandy loam--	0-36	6.0-11	5.6-7.3	0	0	0	0
	36-152	5.0-10	6.1-8.4	0	0	0.0-2.0	0
183:							
Jahant loam-----------------	0-36	13-21	6.1-6.5	0	0	0	0
	36-79	16-24	6.1-6.3	0	0	0	0
	79-124	23-44	6.1-7.3	0	0	0	0
	124-152	---	---	---	---	---	0
187:							
Keyes gravelly loam---------	0-25	9.0-15	5.6-7.3	0	0	0.0-2.0	0
	25-48	20-30	6.1-7.3	0	0	0.0-2.0	0
	48-86	---	---	---	---	---	0
	86-152	---	---	---	---	---	0
Bellota sandy loam----------	0-23	9.0-17	6.1-6.5	0	0	0.0-2.0	0
	23-58	14-20	6.1-6.5	0	0	0.0-2.0	0
	58-89	26-38	6.1-7.3	0	0	0.0-2.0	0
	89-94	---	---	---	---	---	0
	94-152	---	---	---	---	---	0
188:							
Keyes gravelly loam---------	0-25	9.0-15	5.6-7.3	0	0	0.0-2.0	0
	25-48	20-30	6.1-7.3	0	0	0.0-2.0	0
	48-86	---	---	---	---	---	0
	86-152	---	---	---	---	---	0

Table 16.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100g*	*pH*	*Pct*	*Pct*	*dS/m*	
188:							
Redding gravelly loam-------	0-33	4.0-10	5.1-6.0	0	0	0.0-2.0	0
	33-56	18-31	6.1-6.5	0	0	0.0-2.0	0
	56-152	---	---	---	---	---	0
193:							
Madera sandy loam-----------	0-25	3.0-11	5.6-7.3	0	0	0	0
	25-48	10-25	6.1-7.3	0	0	0	0
	48-61	20-35	6.6-8.4	0	0	0.0-2.0	0
	61-152	---	---	---	---	0	---
195:							
Clear Lake clay-------------	0-25	26-57	7.4-8.4	0	0	0	0
	25-160	12-36	7.4-8.4	0-5	0	0.0-4.0	3-15
201:							
Nord loam-------------------	0-64	9.0-16	6.6-8.4	0-4	0	0	1-10
	64-127	8.0-15	7.4-8.4	0-4	0	0.0-2.0	1-10
	127-152	8.0-15	7.4-8.4	0-4	0	0.0-2.0	1-10
202:							
Pardee gravelly loam--------	0-15	7.0-16	5.1-6.5	0	0	0	0
	15-28	22-30	5.1-6.5	0	0	0	0
	28-152	---	---	---	---	---	---
206:							
Pentz fine sandy loam-------	0-23	7.0-16	5.1-6.0	0	0	0	0
	23-30	8.0-17	6.1-7.3	0	0	0	0
	30-41	9.0-17	6.1-7.8	0	0	0	0
	41-152	5.0-10	6.1-7.8	---	---	---	---
207:							
Pentz fine sandy loam-------	0-23	7.0-16	5.1-6.5	0	0	0	0
	23-30	8.0-17	5.6-7.3	0	0	0	0
	30-41	9.0-17	5.3-6.7	0	0	0	0
	41-152	3.0-7.0	---	---	---	---	---
209:							
Pentz loam------------------	0-18	7.0-16	5.1-6.0	0	0	0	0
	18-36	8.0-17	6.1-7.3	0	0	0	0
	36-152	5.0-10	6.1-7.8	0	0	0	0
Bellota loam----------------	0-23	9.0-17	6.1-6.5	0	0	0.0-2.0	0
	23-58	14-20	6.1-6.5	0	0	0.0-2.0	0
	58-89	26-38	6.1-7.3	0	0	0.0-2.0	0
	89-94	---	---	---	---	---	0
	94-152	---	---	---	---	---	0
210:							
Pentz loam------------------	0-23	7.0-16	5.1-6.0	0	0	0	0
	23-30	8.0-17	6.1-7.3	0	0	0	0
	30-41	9.0-17	6.1-7.8	0	0	0	0
	41-152	5.0-10	6.1-7.8	---	---	---	---
Redding gravelly loam-------	0-43	6.0-14	5.1-6.5	0	0	0	0
	43-64	18-31	5.1-6.5	0	0	0	0
	64-152	---	---	---	---	---	---
212:							
Peters clay-----------------	0-15	23-47	5.6-7.3	0	0	0	0
	15-41	26-52	5.6-7.3	0	0	0	0
	41-152	---	---	---	---	---	---

Table 16.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100g*	*pH*	*Pct*	*Pct*	*dS/m*	
219:							
Redding loam----------------	0-33	5.0-14	5.1-6.5	0	0	0	0
	33-56	18-31	5.1-6.5	0	0	0	0
	56-152	---	---	---	---	---	---
220:							
Redding gravelly loam-------	0-13	5.0-13	5.1-5.5	0	0	0	0
	13-43	5.0-13	5.6-6.5	0	0	0	0
	43-56	17-31	6.1-6.5	0	0	0	0
	56-152	30-51	---	---	---	---	---
221:							
Redding gravelly loam-------	0-33	5.0-14	5.1-6.5	0	0	0	0
	33-56	18-31	5.1-6.5	0	0	0	0
	56-152	---	---	---	---	---	---
236:							
San Joaquin sandy loam------	0-28	5.0-11	5.6-6.5	0-1	0	0	0
	28-61	18-26	6.1-7.8	0-1	0	0	0
	61-152	---	---	---	---	---	---
237:							
San Joaquin sandy loam------	0-28	5.0-11	5.6-6.5	0-1	0	0	0
	28-61	18-26	6.1-7.8	0-1	0	0	0
	61-152	---	---	---	---	---	---
241:							
San Joaquin sandy loam------	0-28	5.0-11	5.6-6.5	0-1	0	0	0
	28-61	18-26	6.1-7.8	0-1	0	0	0
	61-152	---	---	---	---	---	---
San Joaquin, thick surface--	0-38	5.0-11	5.6-6.5	0-1	0	0	0
	38-64	10-16	6.1-7.3	0-1	0	0	0
	64-97	18-26	6.1-7.8	0-1	0	0	0
	97-152	---	---	---	---	---	---
266:							
Veritas fine sandy loam-----	0-41	5.0-14	7.4-8.4	0-1	0	0.0-4.0	0
	41-119	4.0-13	7.4-8.4	1-3	0	0.0-4.0	0
	119-152	---	---	---	---	---	---
285:							
Peters clay-----------------	0-15	23-47	5.6-7.3	0	0	0	0
	15-41	26-52	5.6-7.3	0	0	0	0
	41-152	---	---	---	---	---	---
301:							
Archerdale clay loam--------	0-25	24-33	6.1-7.3	0	0	0	0
	25-76	28-40	6.6-7.3	0	0	0	0
	76-152	28-39	6.6-7.3	0	0	0	0
Hicksville silt loam--------	0-25	15-23	5.6-6.5	0	0	0	0
	25-114	21-28	6.1-7.8	0	0	0	0
	114-152	4.0-23	6.1-7.8	0	0	0	0
401:							
Peters silty clay loam------	0-5	23-37	6.6-7.3	0	0	0	0
	5-15	26-41	6.1-7.3	0	0	0	0
	15-35	26-41	6.6-7.3	0	0	0	0
	35-38	26-52	6.6-7.8	---	---	---	---
	38-152	26-52	7.9-9.0	---	---	---	---

Table 16.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100g*	*pH*	*Pct*	*Pct*	*dS/m*	
401:							
Pentz loam	0-23	7.0-16	5.6-6.0	0	0	0	0
	23-30	8.0-17	5.6-7.3	0	0	0	0
	30-41	9.0-17	5.6-7.3	0	0	0	0
	41-152	5.0-10	6.1-7.3	---	---	---	---
451:							
Pentz silt loam	0-15	7.0-16	5.6-6.0	0	0	0	0
	15-25	8.0-17	5.6-7.3	0	0	0	0
	25-31	9.0-17	5.6-7.3	0	0	0	0
	31-152	5.0-10	6.1-7.3	---	---	---	---
Peters silty clay loam	0-5	23-37	6.6-7.3	0	0	0	0
	5-15	26-41	6.1-7.3	0	0	0	0
	15-35	26-41	6.6-7.3	0	0	0	0
	35-38	26-52	6.6-7.8	---	---	---	---
	38-152	26-52	7.9-9.0	---	---	---	---
452:							
Pentz silt loam	0-23	7.0-16	5.6-6.0	0	0	0	0
	23-30	8.0-17	5.6-7.3	0	0	0	0
	30-41	9.0-17	5.6-7.3	0	0	0	0
	41-152	5.0-10	6.1-7.3	---	---	---	---
Peters silty clay loam	0-5	23-37	6.6-7.3	0	0	0	0
	5-15	26-41	6.1-7.3	0	0	0	0
	15-35	26-41	6.6-7.3	0	0	0	0
	35-38	26-52	6.6-7.8	---	---	---	---
	38-152	26-52	7.9-9.0	---	---	---	---
Cometa sandy loam	0-38	9.0-17	5.6-6.5	0	0	0	0
	38-102	24-37	6.1-7.3	0	0	0	0
	102-152	---	6.6-7.3	0	0	0	0
475:							
Pentz silt loam	0-23	9.0-16	5.6-6.0	0	0	0	0
	23-30	8.0-17	5.6-7.3	0	0	0	0
	30-41	12-18	5.6-7.3	0	0	0	0
	41-152	5.0-10	6.1-7.3	---	---	---	---
Peters silty clay loam	0-5	23-37	6.6-7.3	0	0	0	0
	5-15	26-41	6.1-7.3	0	0	0	0
	15-35	26-41	6.6-7.3	0	0	0	0
	35-38	26-52	6.6-7.8	---	---	---	---
	38-152	26-52	7.9-9.0	---	---	---	---
551:							
Amador loam	0-10	10-15	3.5-5.5	0	0	0.0-2.0	0
	10-38	10-15	3.5-5.5	0	0	0.0-2.0	0
	38-152	21-32	3.5-5.5	---	---	---	---
575:							
Amador loam	0-10	10-15	3.5-5.5	0	0	0	0
	10-41	10-15	3.5-5.5	0	0	0	0
	41-152	21-32	3.5-5.5	---	---	---	---
751:							
Auburn silt loam	0-15	9.0-21	5.6-6.0	0	0	0	0
	15-40	8.0-21	5.6-6.5	0	0	0	0
	40-152	---	---	---	---	---	---

Table 16.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100g*	*pH*	*Pct*	*Pct*	*dS/m*	
775:							
Auburn silt loam-----------	0-15	9.0-21	5.6-6.0	0	0	0	0
	15-40	8.0-21	5.6-6.5	0	0	0	0
	40-152	---	---	---	---	---	---
851:							
Mckeonhills clay-----------	0-10	45-70	7.9-8.4	1-10	0	0.0-2.0	0
	10-48	45-70	7.9-8.4	1-10	0	0.0-2.0	0
	48-99	45-70	7.9-8.4	1-12	0	0.0-2.0	0
	99-152	---	7.9-8.4	1-10	---	---	---
999:							
Water.							

Table 17.--Erosion Properties of the Soils

[Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer]

Map symbol and soil name	Depth	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
	In					
100:						
Capay clay	0-20	.24	.24	5	4	86
	20-40	.24	.24			
	40-60	.28	.28			
102:						
Alamo clay	0-10	.20	.20	2	4	86
	10-34	.24	.24			
	34-60	---	---			
106:						
Archerdale, overwash	0-10	.55	.55	5	3	86
	10-30	.20	.20			
	30-60	.20	.20			
107:						
Archerdale clay loam	0-10	.24	.24	5	4	86
	10-30	.20	.20			
	30-60	.24	.24			
127:						
Chuloak sandy loam	0-12	.17	.24	5	3	86
	12-38	.28	.37			
	38-60	.28	.32			
128:						
Cogna loam	0-25	.32	.32	5	3	86
	25-38	.32	.32			
	38-64	.49	.49			
129:						
Cogna loam	0-25	.32	.32	5	3	86
	25-38	.32	.32			
	38-64	.49	.49			
130:						
Columbia, rarely flooded	0-13	.20	.20	5	3	86
	13-60	.32	.32			
131:						
Columbia, occasionally flooded	0-13	.20	.20	5	3	86
	13-60	.43	.43			
134:						
Cometa sandy loam	0-15	.24	.28	3	3	86
	15-40	.24	.28			
	40-60	.24	.28			
142:						
Delhi loamy sand	0-20	.20	.20	5	2	134
	20-60	.20	.20			
151:						
Mine dredge tailings	0-60	---	---	---	8	0
Riverwash	0-6	---	---	---	8	0
	6-60	---	---			

Table 17.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In					
157:						
Exeter sandy clay loam----------	0-12	.24	.28	2	3	86
	12-36	.24	.28			
	36-60	---	---			
158:						
Finrod clay---------------------	0-25	.20	.20	3	4	86
	25-40	.28	.28			
	40-60	---	---			
170:						
Hicksville loam-----------------	0-10	.17	.32	5	3	86
	10-45	.15	.24			
	45-60	.10	.28			
172:						
Hicksville gravelly loam--------	0-10	.17	.32	5	3	86
	10-45	.15	.24			
	45-60	.10	.28			
174:						
Hollenbeck silty clay-----------	0-10	.20	.20	3	4	86
	10-37	.20	.20			
	37-42	.37	.37			
	42-60	---	---			
175:						
Honcut sandy loam---------------	0-14	.20	.28	5	3	86
	14-60	.17	.24			
176:						
Honcut fine sandy loam----------	0-14	.32	.32	5	3	86
	14-60	.15	.24			
177:						
Honcut gravelly sandy loam------	0-14	.20	.28	5	4	86
	14-60	.17	.24			
183:						
Jahant loam---------------------	0-14	.28	.37	3	5	56
	14-31	.28	.37			
	31-49	.17	.24			
	49-60	---	---			
187:						
Keyes gravelly loam-------------	0-10	.24	.37	1	6	48
	10-19	.17	.24			
	19-34	---	---			
	34-60	---	---			
Bellota sandy loam--------------	0-9	.20	.28	2	3	86
	9-23	.20	.28			
	23-35	.20	.24			
	35-37	---	---			
	37-60	---	---			
188:						
Keyes gravelly loam-------------	0-10	.24	.37	1	6	48
	10-19	.17	.24			
	19-34	---	---			
	34-60	---	---			

Table 17.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In					
188:						
Redding gravelly loam-----------	0-13	.20	.43	2	6	48
	13-22	.15	.20			
	22-60	---	---			
193:						
Madera sandy loam---------------	0-10	.28	.32	2	8	0
	10-19	.28	.28			
	19-24	.24	.24			
	24-60	---	---			
195:						
Clear Lake clay-----------------	0-10	.17	.17	5	4	86
	10-63	.20	.20			
201:						
Nord loam-----------------------	0-25	.37	.37	5	5	56
	25-50	.43	.43			
	50-60	.43	.43			
202:						
Pardee gravelly loam------------	0-6	.20	.43	1	6	48
	6-11	.10	.28			
	11-60	---	---			
206:						
Pentz fine sandy loam-----------	0-9	.32	.49	2	5	56
	9-12	.24	.37			
	12-16	.24	.37			
	16-60	---	---			
207:						
Pentz fine sandy loam-----------	0-9	.20	.28	2	5	56
	9-12	.20	.32			
	12-16	.20	.28			
	16-60	---	---			
209:						
Pentz loam----------------------	0-7	.32	.49	2	5	56
	7-14	.24	.37			
	14-60	---	---			
Bellota loam--------------------	0-9	.20	.28	2	5	56
	9-23	.20	.28			
	23-35	.20	.24			
	35-37	---	---			
	37-60	---	---			
210:						
Pentz loam----------------------	0-9	.32	.49	2	5	56
	9-12	.24	.37			
	12-16	.24	.37			
	16-60	---	---			
Redding gravelly loam-----------	0-17	.17	.37	2	6	48
	17-25	.17	.20			
	25-60	---	---			
212:						
Peters clay---------------------	0-6	.20	.24	2	4	86
	6-16	.17	.20			
	16-60	---	---			

Table 17.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In					
219:						
Redding loam-------------------	0-13	.20	.43	2	5	56
	13-22	.20	.24			
	22-60	---	---			
220:						
Redding gravelly loam----------	0-5	.24	.49	2	6	48
	5-17	.24	.49			
	17-22	.15	.20			
	22-60	---	---			
221:						
Redding gravelly loam----------	0-13	.20	.43	2	6	48
	13-22	.17	.24			
	22-60	---	---			
236:						
San Joaquin sandy loam---------	0-11	.24	.28	2	3	86
	11-24	.20	.24			
	24-60	---	---			
237:						
San Joaquin sandy loam---------	0-11	.24	.28	2	3	86
	11-24	.20	.24			
	24-60	---	---			
241:						
San Joaquin sandy loam---------	0-11	.37	.43	2	3	86
	11-24	.20	.24			
	24-60	---	---			
San Joaquin, thick surface------	0-15	.32	.32	2	3	86
	15-25	.28	.28			
	25-38	.24	.24			
	38-60	---	---			
266:						
Veritas fine sandy loam--------	0-16	.32	.37	3	3	86
	16-47	.32	.37			
	47-60	---	---			
285:						
Peters clay--------------------	0-6	.20	.24	2	4	86
	6-16	.17	.20			
	16-60	---	---			
301:						
Archerdale clay loam-----------	0-10	.17	.24	5	4	86
	10-30	.15	.20			
	30-60	.17	.24			
Hicksville silt loam-----------	0-10	.17	.32	5	6	48
	10-45	.15	.24			
	45-60	.10	.28			
401:						
Peters silty clay loam---------	0-2	.28	.32	1	5	56
	2-6	.24	.28			
	6-14	.24	.28			
	14-15	---	---			
	15-60	---	---			

Table 17.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In					
401:						
Pentz loam	0-9	.32	.49	1	8	0
	9-12	.24	.37			
	12-16	.24	.37			
	16-60	---	---			
451:						
Pentz silt loam	0-6	.32	.49	2	5	56
	6-10	.24	.37			
	10-12	.24	.37			
	12-60	---	---			
Peters silty clay loam	0-2	.28	.32	2	4	86
	2-6	.24	.28			
	6-14	.24	.28			
	14-15	---	---			
	15-60	---	---			
452:						
Pentz silt loam	0-9	.32	.49	1	5	56
	9-12	.24	.37			
	12-16	.24	.37			
	16-60	---	---			
Peters silty clay loam	0-2	.28	.32	1	4	86
	2-6	.24	.28			
	6-14	.24	.28			
	14-15	---	---			
	15-60	---	---			
Cometa sandy loam	0-15	.24	.28	3	3	86
	15-40	.24	.28			
	40-60	---	---			
475:						
Pentz silt loam	0-9	.32	.37	2	5	56
	9-12	.37	.43			
	12-16	.32	.43			
	16-60	---	---			
Peters silty clay loam	0-2	.28	.32	2	4	86
	2-6	.24	.28			
	6-14	.24	.28			
	14-15	---	---			
	15-60	---	---			
551:						
Amador loam	0-4	.28	.37	1	5	56
	4-15	.32	.37			
	15-60	---	---			
575:						
Amador loam	0-4	.32	.37	1	5	56
	4-16	.28	.37			
	16-60	---	---			
751:						
Auburn silt loam	0-6	.43	.55	1	5	56
	6-16	.32	.55			
	16-60	---	---			

Table 17.--Erosion Properties of the Soils--Continued

Map symbol and soil name	Depth	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In					
775:						
Auburn silt loam----------------	0-6	.43	.55	1	5	56
	6-16	.32	.55			
	16-60	---	---			
851:						
Mckeonhills clay----------------	0-4	.15	.17	3	4	86
	4-19	.15	.17			
	19-39	.15	.17			
	39-60	---	---			
999:						
Water.						

Table 18.--Water Features

[See text for definitions of terms used in this table. Estimates of the frequency of ponding and flo
whole year rather than to individual months. Absence of an entry indicates that the feature is
data were not estimated]

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency
			Ft	*Ft*	*Ft*		
100:							
Capay clay----------------------	D						
		January	---	---	0.0-0.5	Brief	Occasional
		February	---	---	0.0-0.5	Brief	Occasional
		March	---	---	0.0-0.5	Brief	Occasional
		April	---	---	0.0-0.5	Brief	Occasional
		May	---	---	0.0-0.5	Brief	Occasional
		October	---	---	0.0-0.5	Brief	Occasional
		November	---	---	0.0-0.5	Brief	Occasional
		December	---	---	0.0-0.5	Brief	Occasional
102:							
Alamo clay----------------------	D						
		January	---	---	0.0-0.5	Brief	Occasional
		February	---	---	0.0-0.5	Brief	Occasional
		March	---	---	0.0-0.5	Brief	Occasional
		April	---	---	0.0-0.5	Brief	Occasional
		May	---	---	0.0-0.5	Brief	Occasional
		October	---	---	0.0-0.5	Brief	Occasional
		November	---	---	0.0-0.5	Brief	Occasional
		December	---	---	0.0-0.5	Brief	Occasional
106:							
Archerdale, overwash------------	C						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Du
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	
			Ft	*Ft*	*Ft*			
107:								
Archerdale clay loam------------	C							
		January	---	---	---	---	None	
		February	---	---	---	---	None	
		March	---	---	---	---	None	
		April	---	---	---	---	None	
		May	---	---	---	---	None	
		October	---	---	---	---	None	
		November	---	---	---	---	None	
		December	---	---	---	---	None	
127:								
Chuloak sandy loam--------------	B							
		January	---	---	---	---	None	
		February	---	---	---	---	None	
		March	---	---	---	---	None	
		April	---	---	---	---	None	
		May	---	---	---	---	None	
		October	---	---	---	---	None	
		November	---	---	---	---	None	
		December	---	---	---	---	None	
128:								
Cogna loam---------------------	B							
		January	---	---	---	---	None	
		February	---	---	---	---	None	
		March	---	---	---	---	None	
		April	---	---	---	---	None	
		May	---	---	---	---	None	
		October	---	---	---	---	None	
		November	---	---	---	---	None	
		December	---	---	---	---	None	
129:								
Cogna loam---------------------	B							
		January	---	---	---	---	None	
		February	---	---	---	---	None	
		March	---	---	---	---	None	
		April	---	---	---	---	None	
		May	---	---	---	---	None	
		October	---	---	---	---	None	
		November	---	---	---	---	None	
		December	---	---	---	---	None	

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency
			Ft	*Ft*	*Ft*		
130:							
Columbia, rarely flooded--------	B						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
131:							
Columbia, occasionally flooded--	C						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
134:							
Cometa sandy loam---------------	D						
		Jan-Dec	---	---	---	---	None
142:							
Delhi loamy sand----------------	A						
		Jan-Dec	---	---	---	---	None
151:							
Mine dredge tailings------------	A						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Du
			Ft	Ft	Ft			
151:								
Riverwash----------------------	D							
		January	0.0-2.0	>6.0	---	---	None	Ve
		February	0.0-2.0	>6.0	---	---	None	Ve
		March	0.0-2.0	>6.0	---	---	None	Ve
		April	0.0-2.0	>6.0	---	---	None	Ve
		May	0.0-2.0	>6.0	---	---	None	Ve
		October	0.0-2.0	>6.0	---	---	None	Ve
		November	0.0-2.0	>6.0	---	---	None	Ve
		December	0.0-2.0	>6.0	---	---	None	Ve
157:								
Exeter sandy clay loam----------	C							
		Jan-Dec	---	---	---	---	None	
158:								
Finrod clay--------------------	C							
		January	---	---	---	---	None	
		February	---	---	---	---	None	
		March	---	---	---	---	None	
		April	---	---	---	---	None	
		May	---	---	---	---	None	
		October	---	---	---	---	None	
		November	---	---	---	---	None	
		December	---	---	---	---	None	
170:								
Hicksville loam----------------	B							
		Jan-Dec	---	---	---	---	None	
172:								
Hicksville gravelly loam--------	B							
		Jan-Dec	---	---	---	---	None	
174:								
Hollenbeck silty clay-----------	D							
		January	---	---	---	---	None	
		February	---	---	---	---	None	
		March	---	---	---	---	None	
		April	---	---	---	---	None	
		May	---	---	---	---	None	
		October	---	---	---	---	None	
		November	---	---	---	---	None	
		December	---	---	---	---	None	

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency
			Ft	*Ft*	*Ft*		
175:							
Honcut sandy loam---------------	B						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
176:							
Honcut fine sandy loam----------	B						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
177:							
Honcut gravelly sandy loam------	B						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
183:							
Jahant loam---------------------	D						
		Jan-Dec	---	---	---	---	None
187:							
Keyes gravelly loam-------------	D						
		Jan-Dec	---	---	---	---	None
Bellota sandy loam--------------	D						
		Jan-Dec	---	---	---	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency
			Ft	*Ft*	*Ft*		
188:							
Keyes gravelly loam-------------	D						
		Jan-Dec	---	---	---	---	None
Redding gravelly loam-----------	D						
		Jan-Dec	---	---	---	---	None
193:							
Madera sandy loam---------------	D						
		Jan-Dec	---	---	---	---	None
195:							
Clear Lake clay-----------------	D						
		January	3.0-6.0	>6.0	0.0-0.5	Brief	Occasional
		February	3.0-6.0	>6.0	0.0-0.5	Brief	Occasional
		March	3.0-6.0	>6.0	0.0-0.5	Brief	Occasional
		April	3.0-6.0	>6.0	0.0-0.5	Brief	Occasional
		May	---	---	0.0-0.5	Brief	Occasional
		October	---	---	0.0-0.5	Brief	Occasional
		November	---	---	0.0-0.5	Brief	Occasional
		December	3.0-6.0	>6.0	0.0-0.5	Brief	Occasional
201:							
Nord loam-----------------------	B						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
202:							
Pardee gravelly loam------------	D						
		Jan-Dec	---	---	---	---	None
206:							
Pentz fine sandy loam-----------	D						
		Jan-Dec	---	---	---	---	None
207:							
Pentz fine sandy loam-----------	D						
		Jan-Dec	---	---	---	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency
			Ft	*Ft*	*Ft*		
209:							
Pentz loam----------------------	D						
		Jan-Dec	---	---	---	---	None
Bellota loam--------------------	D						
		Jan-Dec	---	---	---	---	None
210:							
Pentz loam----------------------	D						
		Jan-Dec	---	---	---	---	None
Redding gravelly loam-----------	D						
		Jan-Dec	---	---	---	---	None
212:							
Peters clay---------------------	D						
		Jan-Dec	---	---	---	---	None
219:							
Redding loam--------------------	D						
		Jan-Dec	---	---	---	---	None
220:							
Redding gravelly loam-----------	D						
		Jan-Dec	---	---	---	---	None
221:							
Redding gravelly loam-----------	D						
		Jan-Dec	---	---	---	---	None
236:							
San Joaquin sandy loam----------	D						
		Jan-Dec	---	---	---	---	None
237:							
San Joaquin sandy loam----------	D						
		Jan-Dec	---	---	---	---	None
241:							
San Joaquin sandy loam----------	D						
		Jan-Dec	---	---	---	---	None
San Joaquin, thick surface------	D						
		Jan-Dec	---	---	---	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency
			Ft	Ft	Ft		
266:							
Veritas fine sandy loam---------	B						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
285:							
Peters clay---------------------	D						
		Jan-Dec	---	---	---	---	None
301:							
Archerdale clay loam------------	C						
		January	---	---	---	---	None
		February	---	---	---	---	None
		March	---	---	---	---	None
		April	---	---	---	---	None
		May	---	---	---	---	None
		October	---	---	---	---	None
		November	---	---	---	---	None
		December	---	---	---	---	None
Hicksville silt loam------------	B						
		Jan-Dec	---	---	---	---	None
401:							
Peters silty clay loam----------	D						
		Jan-Dec	---	---	---	---	None
Pentz loam----------------------	D						
		Jan-Dec	---	---	---	---	None
451:							
Pentz silt loam-----------------	D						
		Jan-Dec	---	---	---	---	None
Peters silty clay loam----------	D						
		Jan-Dec	---	---	---	---	None
452:							
Pentz silt loam-----------------	D						
		Jan-Dec	---	---	---	---	None

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Du
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	
			Ft	*Ft*	*Ft*			
452:								
Peters silty clay loam----------	D							
		Jan-Dec	---	---	---	---	None	
Cometa sandy loam---------------	D							
		Jan-Dec	---	---	---	---	None	
475:								
Pentz silt loam-----------------	D							
		Jan-Dec	---	---	---	---	None	
Peters silty clay loam----------	D							
		Jan-Dec	---	---	---	---	None	
551:								
Amador loam---------------------	D							
		Jan-Dec	---	---	---	---	None	
575:								
Amador loam---------------------	D							
		Jan-Dec	---	---	---	---	None	
751:								
Auburn silt loam----------------	D							
		Jan-Dec	---	---	---	---	None	
775:								
Auburn silt loam----------------	D							
		Jan-Dec	---	---	---	---	None	
851:								
Mckeonhills clay----------------	D							
		Jan-Dec	---	---	---	---	None	

Table 19.--Soil Features

[See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
100:							
Capay clay	---	---	---	---	Low	High	Moderate
102:							
Alamo clay	Duripan	20-40	---	Strongly cemented	Low	High	Low
106:							
Archerdale, overwash	---	---	---	---	None	Moderate	Low
107:							
Archerdale clay loam	---	---	---	---	None	Moderate	Low
127:							
Chuloak sandy loam	---	---	---	---	Low	High	Low
128:							
Cogna loam	---	---	---	---	None	High	Low
129:							
Cogna loam	---	---	---	---	None	High	Low
130:							
Columbia, rarely flooded	---	---	---	---	Low	Moderate	Low
131:							
Columbia, occasionally flooded	---	---	---	---	Low	Moderate	Low
134:							
Cometa sandy loam	Cemented horizon	20-40	---	Weakly cemented	None	Moderate	Moderate
142:							
Delhi loamy sand	---	---	---	---	Low	Moderate	Low
151:							
Mine dredge tailings	---	---	---	---	None	---	---
Riverwash	---	---	---	---	None	---	---
157:							
Exeter sandy clay loam	Duripan	20-40	---	Very strongly cemented	None	High	Low
158:							
Finrod clay	Duripan	40-60	---	Strongly cemented	None	High	Low
170:							
Hicksville loam	---	---	---	---	None	Moderate	Low
172:							
Hicksville gravelly loam	---	---	---	---	None	Moderate	Low
174:							
Hollenbeck silty clay	Duripan	40-60	4-17	Strongly cemented	None	High	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	*In*				
175:							
Honcut sandy loam	---	---	---	---	None	High	Low
176:							
Honcut fine sandy loam	---	---	---	---	None	High	Low
177:							
Honcut gravelly sandy loam	---	---	---	---	Low	High	Low
183:							
Jahant loam	Duripan	40-60	4-17	Indurated	None	Moderate	Moderate
187:							
Keyes gravelly loam	Abrupt textural change	10-20	4-17	Noncemented	None	High	Low
	Duripan	20-40		Very strongly cemented			
	Paralithic bedrock	10-20		Moderately cemented			
Bellota sandy loam	Abrupt textural change	20-40	1-3	Noncemented	None	High	Moderate
	Duripan	21-50		Strongly cemented			
	Paralithic bedrock	20-40		Weakly cemented			
188:							
Keyes gravelly loam	Abrupt textural change	10-20	---	Noncemented	None	High	Low
	Duripan	20-40		Very strongly cemented			
	Paralithic bedrock	10-20		Moderately cemented			
Redding gravelly loam	Abrupt textural change	20-40	---	Noncemented	None	High	Moderate
	Duripan	20-40		Indurated			
193:							
Madera sandy loam	Abrupt textural change	20-40	---	Noncemented	None	High	Low
	Duripan	20-40		Strongly cemented			
195:							
Clear Lake clay	---	---	---	---	Low	High	Moderate
201:							
Nord loam	---	---	---	---	Low	High	Low
202:							
Pardee gravelly loam	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Moderate
206:							
Pentz fine sandy loam	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Moderate

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
207:							
Pentz fine sandy loam------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Moderate
209:							
Pentz loam----------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Moderate
Bellota loam--------------	Abrupt textural change	20-40	0-3	Noncemented	None	High	Moderate
	Duripan	21-50		Indurated			
	Paralithic bedrock	20-40		Weakly cemented			
210:							
Pentz loam----------------	Paralithic bedrock	10-20	---	Moderately cemented	Low	Moderate	Moderate
Redding gravelly loam------	Abrupt textural change	20-40	---	Noncemented	Low	High	Moderate
	Duripan	20-40		Strongly cemented			
212:							
Peters clay---------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
219:							
Redding loam--------------	Abrupt textural change	20-40	---	Strongly cemented	None	High	Moderate
	Duripan	20-40					
220:							
Redding gravelly loam------	Abrupt textural change	20-40	---	Strongly cemented	Low	High	Moderate
	Duripan	20-40					
221:							
Redding gravelly loam------	Abrupt textural change	20-40	---	Strongly cemented	Low	High	Moderate
	Duripan	20-40					
236:							
San Joaquin sandy loam-----	Abrupt textural change	20-40	---	Noncemented	Low	Moderate	Moderate
	Duripan	20-40		Strongly cemented			
237:							
San Joaquin sandy loam-----	Abrupt textural change	20-40	---	Noncemented	Low	Moderate	Moderate
	Duripan	20-40		Strongly cemented			

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
241:							
San Joaquin sandy loam-----	Abrupt textural change	20-40	---	Noncemented	Low	Moderate	Moderate
	Duripan	20-40		Strongly cemented			
San Joaquin, thick surface-	Abrupt textural change	20-40	---	Noncemented	Low	Moderate	Moderate
	Duripan	20-40		Strongly cemented			
266:							
Veritas fine sandy loam----	Duripan	40-60	---	Strongly cemented	Low	High	Low
285:							
Peters clay----------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
301:							
Archerdale clay loam-------	---	---	---	---	None	Moderate	Low
Hicksville silt loam-------	---	---	---	---	None	Moderate	Low
401:							
Peters silty clay loam-----	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
Pentz loam-----------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
451:							
Pentz silt loam------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
Peters silty clay loam-----	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
452:							
Pentz silt loam------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
Peters silty clay loam-----	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
Cometa sandy loam----------	Cemented horizon	40-60	---	Weakly cemented	None	Moderate	Moderate
475:							
Pentz silt loam------------	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
Peters silty clay loam-----	Paralithic bedrock	10-20	---	Moderately cemented	None	Moderate	Low
551:							
Amador loam----------------	Paralithic bedrock	10-20	---	Moderately cemented	Low	High	High
575:							
Amador loam----------------	Paralithic bedrock	10-20	---	Moderately cemented	Low	High	High

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
751:							
Auburn silt loam----------	Lithic bedrock	10-20	---	Indurated	Low	Low	Low
775:							
Auburn silt loam----------	Lithic bedrock	10-20	---	Indurated	Low	Low	Low
851:							
Mckeonhills clay----------	Dense material	20-40	---	Moderately cemented	Low	Low	Low
999:							
Water.							

Table 20.--Taxonomic Classification of the Soils

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series]

Soil name	Family or higher taxonomic class
Alamo	Fine, smectitic, thermic Typic Duraquolls
*Amador	Loamy, mixed, active, thermic, shallow Typic Dystroxerepts
Archerdale	Fine, mixed, superactive, thermic Pachic Haploxerolls
Auburn	Loamy, mixed, superactive, thermic Lithic Haploxerepts
Bellota	Fine-loamy, mixed, superactive, thermic Abruptic Durixeralfs
*Capay	Fine, smectitic, thermic Typic Calcixererts
Chuloak	Fine-loamy, mixed, superactive, thermic Typic Argixerolls
Clear Lake	Fine, smectitic, thermic Xeric Endoaquerts
Cogna	Fine-silty, mixed, superactive, thermic Calcic Pachic Haploxerolls
Columbia	Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Xerofluvents
Cometa	Fine, mixed, superactive, thermic Typic Palexeralfs
Delhi	Mixed, thermic Typic Xeropsamments
Exeter	Fine-loamy, mixed, superactive, thermic Typic Durixeralfs
Finrod	Fine, mixed, superactive, thermic Pachic Haploxerolls
Hicksville	Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs
Hollenbeck	Fine, smectitic, thermic Chromic Haploxererts
Honcut	Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents
Jahant	Fine-loamy, mixed, superactive, thermic Mollic Palexeralfs
Keyes	Clayey, mixed, active, thermic, shallow Abruptic Durixeralfs
Madera	Fine, smectitic, thermic Abruptic Durixeralfs
Mckeonhills	Fine, smectitic, thermic Aridic Haploxererts
*Nord	Coarse-loamy, mixed, superactive, thermic Pachic Haploxerolls
Pardee	Loamy-skeletal, mixed, superactive, thermic Lithic Mollic Haploxeralfs
Pentz	Loamy, mixed, superactive, thermic, shallow Ultic Haploxerolls
Peters	Clayey, smectitic, thermic, shallow Typic Haploxerolls
Redding	Fine, mixed, active, thermic Abruptic Durixeralfs
San Joaquin	Fine, mixed, active, thermic Abruptic Durixeralfs
Veritas	Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls

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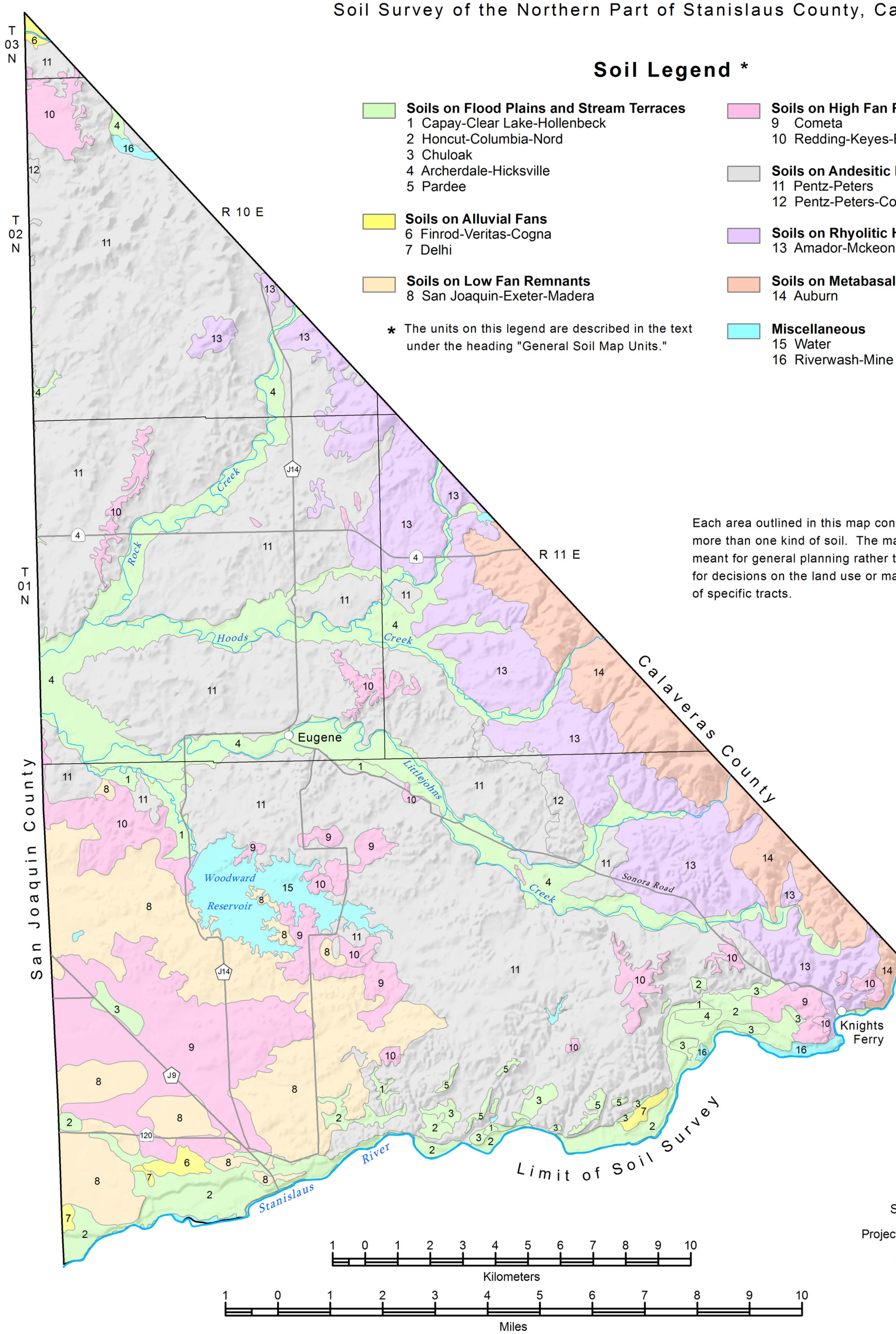
General Soil Map

Soil Survey of the Northern Part of Stanislaus County, California



Soil Legend *

Soils on Flood Plains and Stream Terraces
1 Capay-Clear Lake-Hollenbeck
2 Honcut-Columbia-Nord
3 Chuloak
4 Archerdale-Hicksville
5 Pardee

Soils on Alluvial Fans
6 Finrod-Veritas-Cogna
7 Delhi

Soils on Low Fan Remnants
8 San Joaquin-Exeter-Madera

Soils on High Fan Remnants
9 Cometa
10 Redding-Keyes-Bellota

Soils on Andesitic Hills
11 Pentz-Peters
12 Pentz-Peters-Cometa

Soils on Rhyolitic Hills
13 Amador-Mckeonhills

Soils on Metabasaltic Hills
14 Auburn

Miscellaneous
15 Water
16 Riverwash-Mine Dredge Tailings

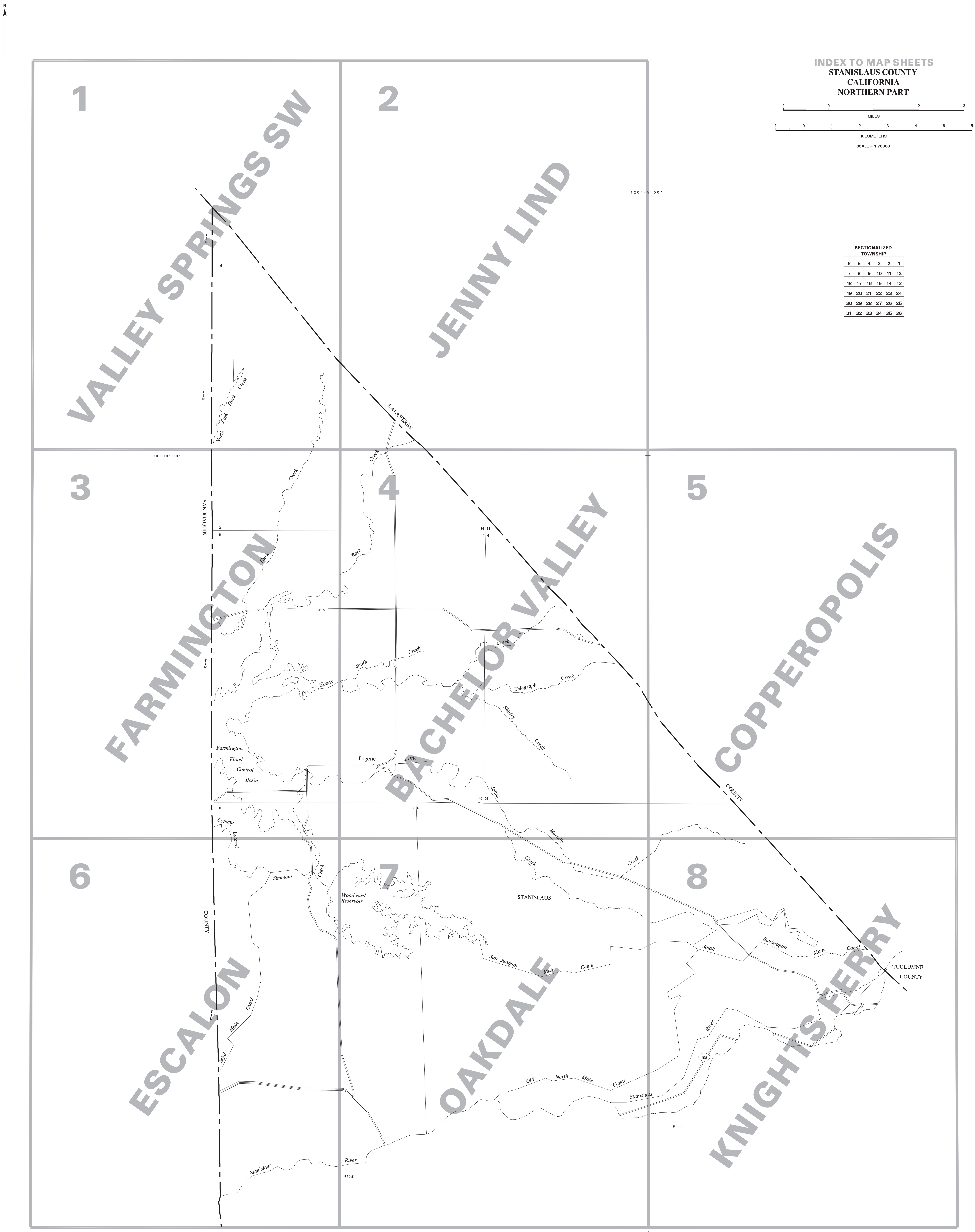
* The units on this legend are described in the text under the heading "General Soil Map Units."

Each area outlined in this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the land use or management of specific tracts.

Scale 1:150,000

Projection UTM Zone 10

Datum NAD83


INDEX TO MAP SHEETS
STANISLAUS COUNTY
CALIFORNIA
NORTHERN PART
MILES
KILOMETERS
SCALE = 1:70000
SECTIONALIZED TOWNSHIP
1
VALLEY SPRINGS SW
2
JENNY LIND
3
FARMINGTON
4
BACHELOR VALLEY
5
COPPEROPOLIS
6
ESCALON
7
OAKDALE
8
KNIGHTS FERRY
CALAVERAS
COUNTY
SAN JOAQUIN
COUNTY
STANISLAUS
TUOLUMNE
COUNTY
North Fork Duck Creek
Duck Creek
Rock Creek
Hoods Creek
Smith Creek
Telegraph Creek
Shirley Creek
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Martells Creek
Farmington
Flood
Control
Basin
Eugene
Cometa Lateral
Simmons
Woodward Reservoir
San Juaquin Main Canal
South Sanjuaquin Main Canal
Sjid Main Canal
Old North Main Canal
Stanislaus River
R10 E
R11 E

GEND

rwash, 0 to 2 percent slopes
slopes
opes
verwash

percent slopes, rarely flooded
l, 0 to 2 percent slopes, occasionally flooded
opes
s
ex, 0 to 5 percent slopes
t slopes

occasionally flooded
t slopes, occasionally flooded
opes
pes
t slopes
rcent slopes

nt slopes
nt slopes
opes
2 percent slopes

lopes
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nt slopes
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nt slopes

slopes
t slopes
nt slopes
nt slopes
slopes
t slopes

2 percent slopes
ent slopes
cent slopes
15 percent slopes
cent slopes
lopes

es
pes
es

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

National, state, or province

County or parish

Minor civil division

Reservation (national forest or park, state forest or park)

Land grant

Limit of soil survey (label) and/or denied access area

Field sheet matchline and neatline

Previously published survey

OTHER BOUNDARY

Airport, airfield

Cemetery

City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

Divided roads

Other roads

Trail

ROAD EMBLEMS AND DESIGNATIONS

Interstate 173 79 345

Federal 287 410 224

State 52 52 347

County, farm or ranch 1283

RAILROAD

POWER TRANSMISSION LINE

PIPELINE

FENCE

LEVEES

Without road

With road

With railroad

Single side slope

DAMS

Medium or small

LANDFORM FEATURES

Prominent hill or peak

Soil sample site

MISCELLANEOUS CULTURAL FEATURES

Farmstead, house

Church

School

Other religion — Mt Carmel

Located object — Ranger Station

Tank — Petroleum

Lookout tower

Oil and/or natural gas wells

Windmill

Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

Perennial stream, double line

Perennial stream, single line — Label only

Intermittent stream — Label only

Drainage end — Label only

DRAINAGE AND IRRIGATION

Double-line canal — CANAL

Perennial drainage and/or irrigation ditch — Label only

Intermittent drainage and/or irrigation ditch — Label only

SMALL LAKES, PONDS, AND RESERVOIRS

Perennial water

Miscellaneous water

Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

Spring

Well, artesian

Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — 100 292

LANDFORM FEATURES

Bedrock escarpment

Other than bedrock escarpment

Short steep slope

Gully

Depression, closed

Sinkhole

Borrow pit

Gravel pit

Mine or quarry

Landfill

MISCELLANEOUS SURFACE FEATURES

Blowout

Clay spot

Gravelly spot

Lava spot

Marsh or swamp

Rock outcrop (includes sandstone and shale)

Saline spot

Sandy spot

Severely eroded spot

Slide or slip

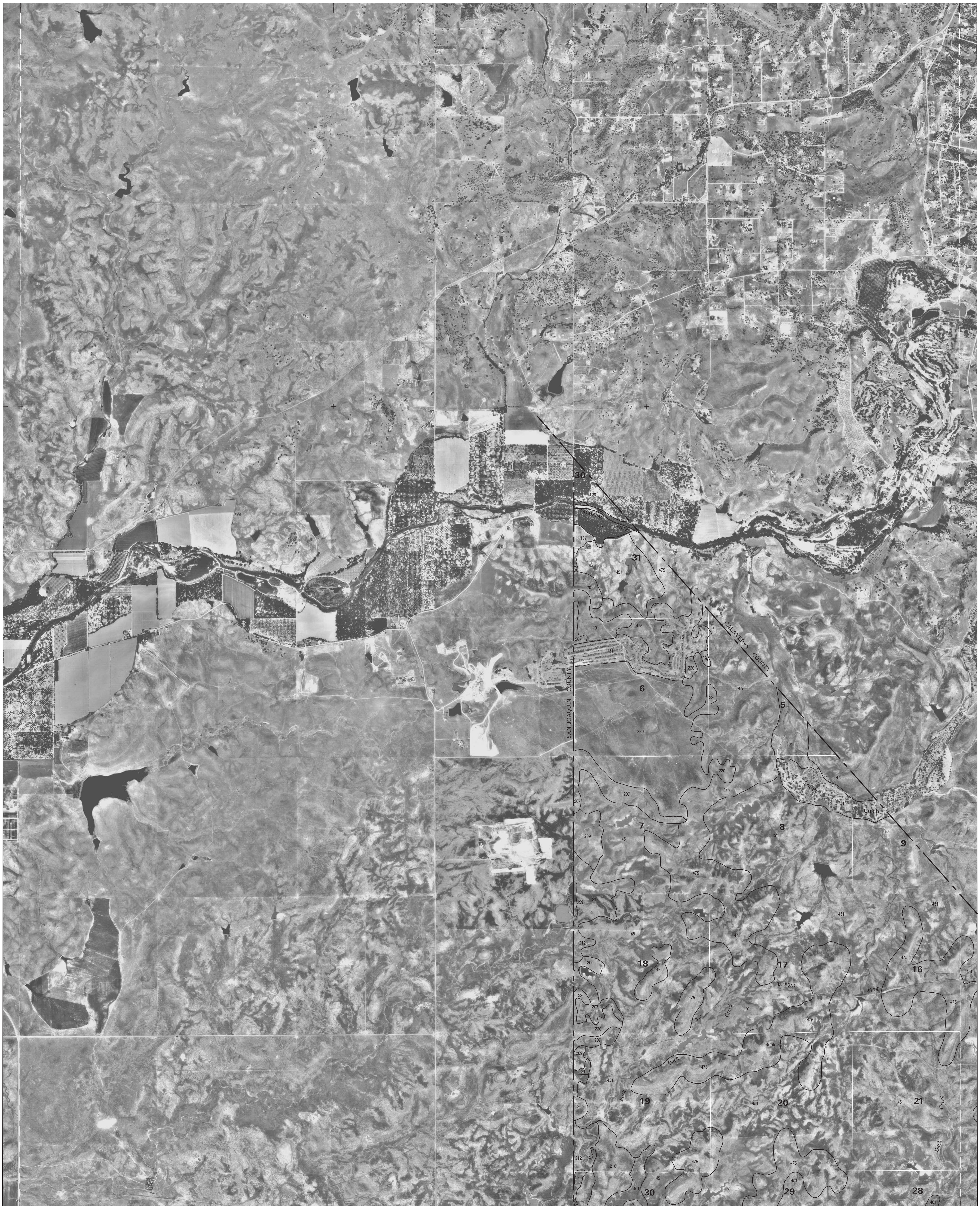
Sodic spot

Spoil area

Stony spot

Very stony spot

Wet spot



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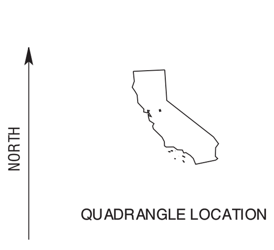
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.



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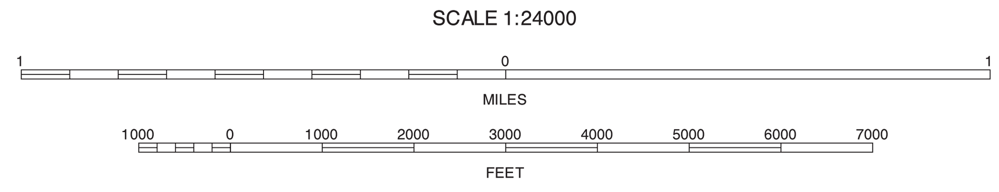
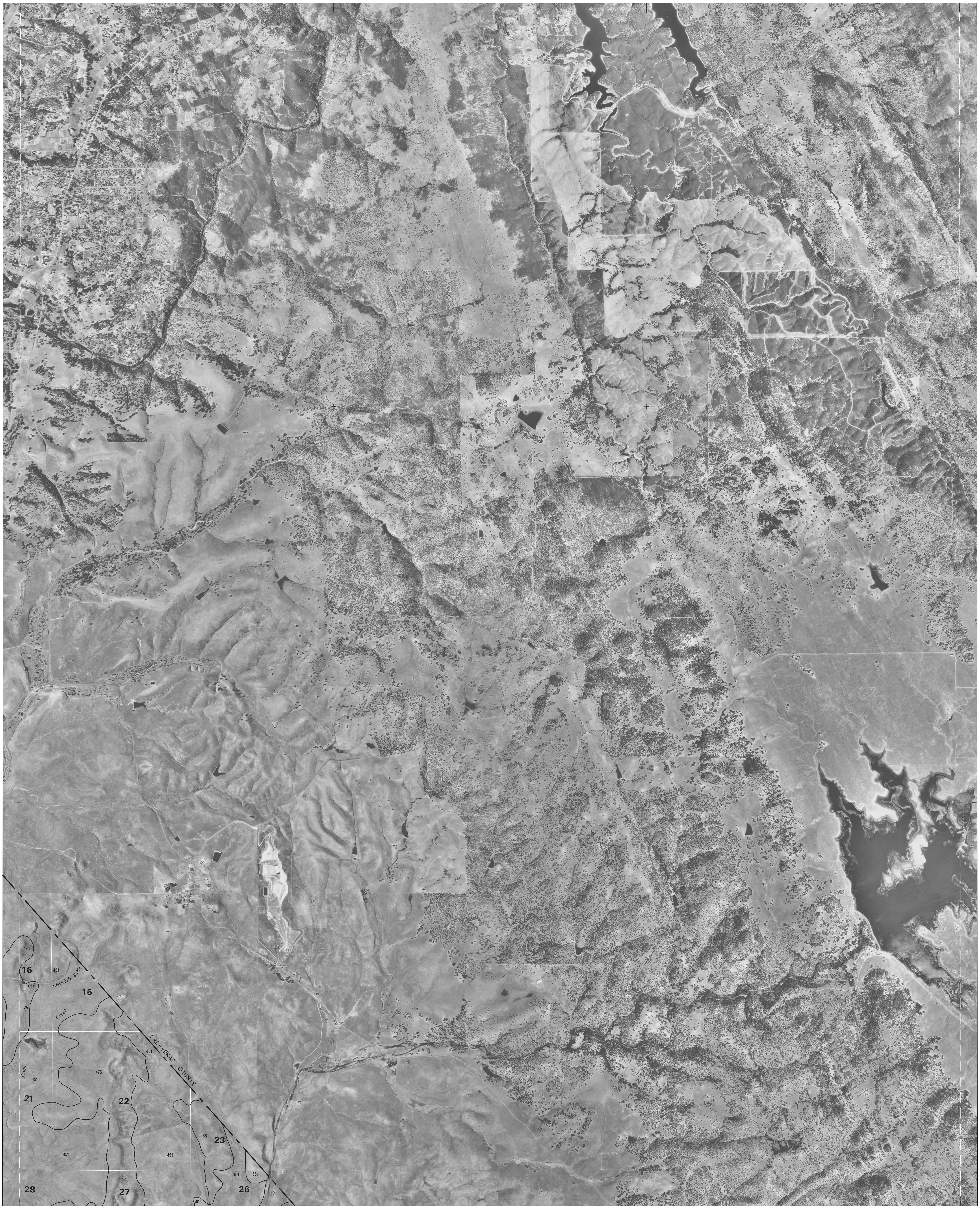


VALLEY SPRINGS SW, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 8

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

JENNY LIND, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 8

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

STANISLAUS COUNTY, CALIFORNIA, NORTHERN PART
FARMINGTON QUADRANGLE
SHEET NUMBER 3 OF 8

Joins sheet 1, Valley Springs SW

Joins sheet 2, Jenny Lind

121° 00′00″ 120° 57′30″ R. 9 E. R. 10 E. 120° 55′00″ 120° 52′30″

38° 00′00″

T. 1 N.
T. 1 S.

37° 57′30″

37° 55′00″

T. 1 N.
T. 1 S.

37° 52′30″

Joins sheet 4, Bachelor Valley

121° 00′00″ 120° 57′30″ R. 9 E. R. 10 E. 120° 55′00″ 120° 52′30″

Joins sheet 6, Escalon

Joins sheet 7, Oakdale

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

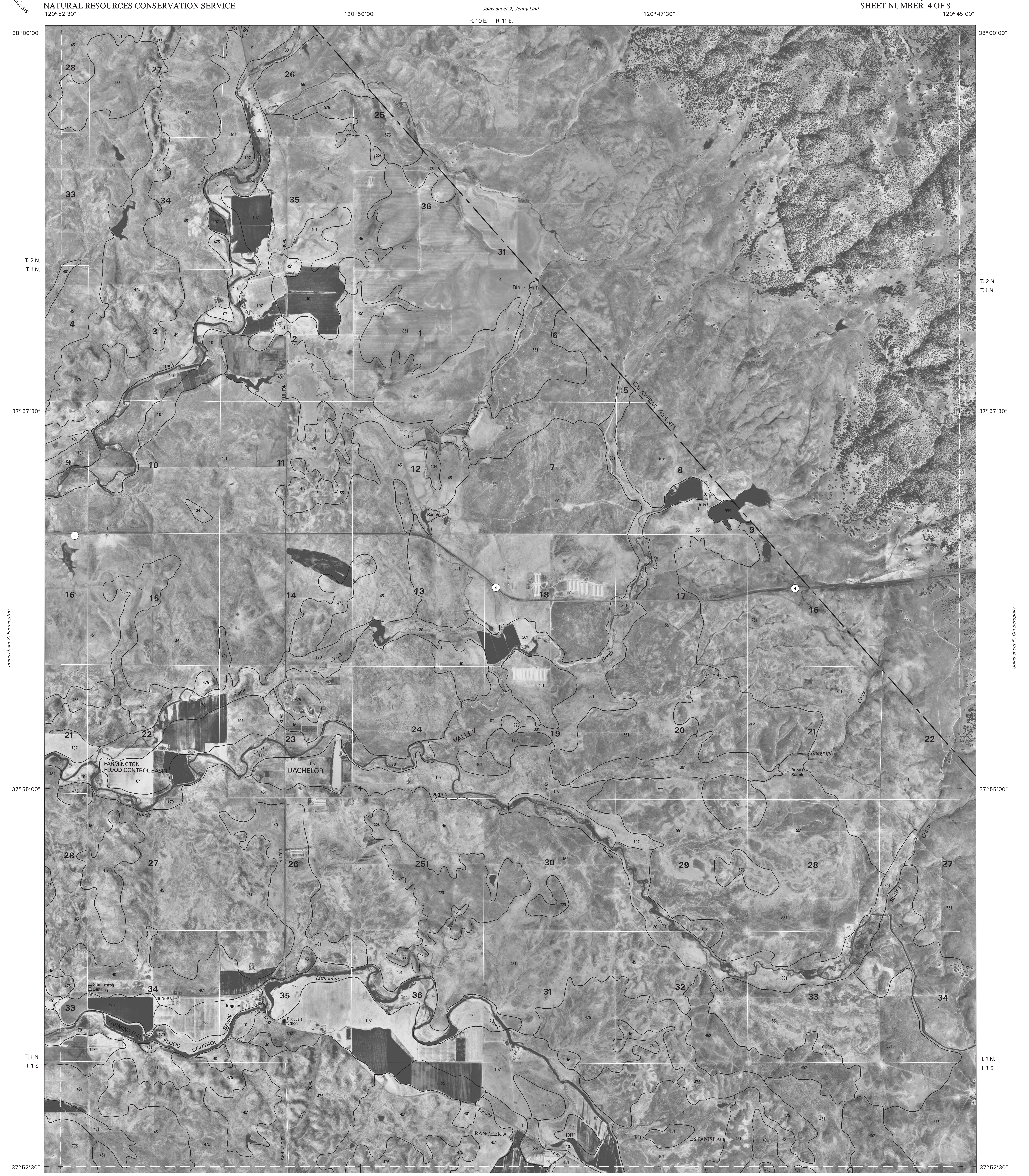
1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

FARMINGTON, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 8

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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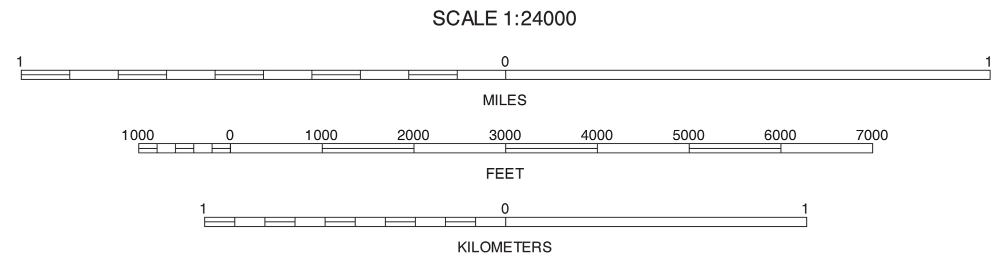
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.

QUADRANGLE LOCATION



BACHELOR VALLEY, CALIFORNIA

7.5 MINUTE SERIES
SHEET NUMBER 4 OF 8

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 2, Jenny Lind

120° 45'00" | 120° 42'30" | R. 11 E. R. 12 E. | 120° 40'00" | 120° 37'30"

38° 00'00" | 38° 00'00"

T. 2 N. T. 1 N. | T. 2 N. T. 1 N.

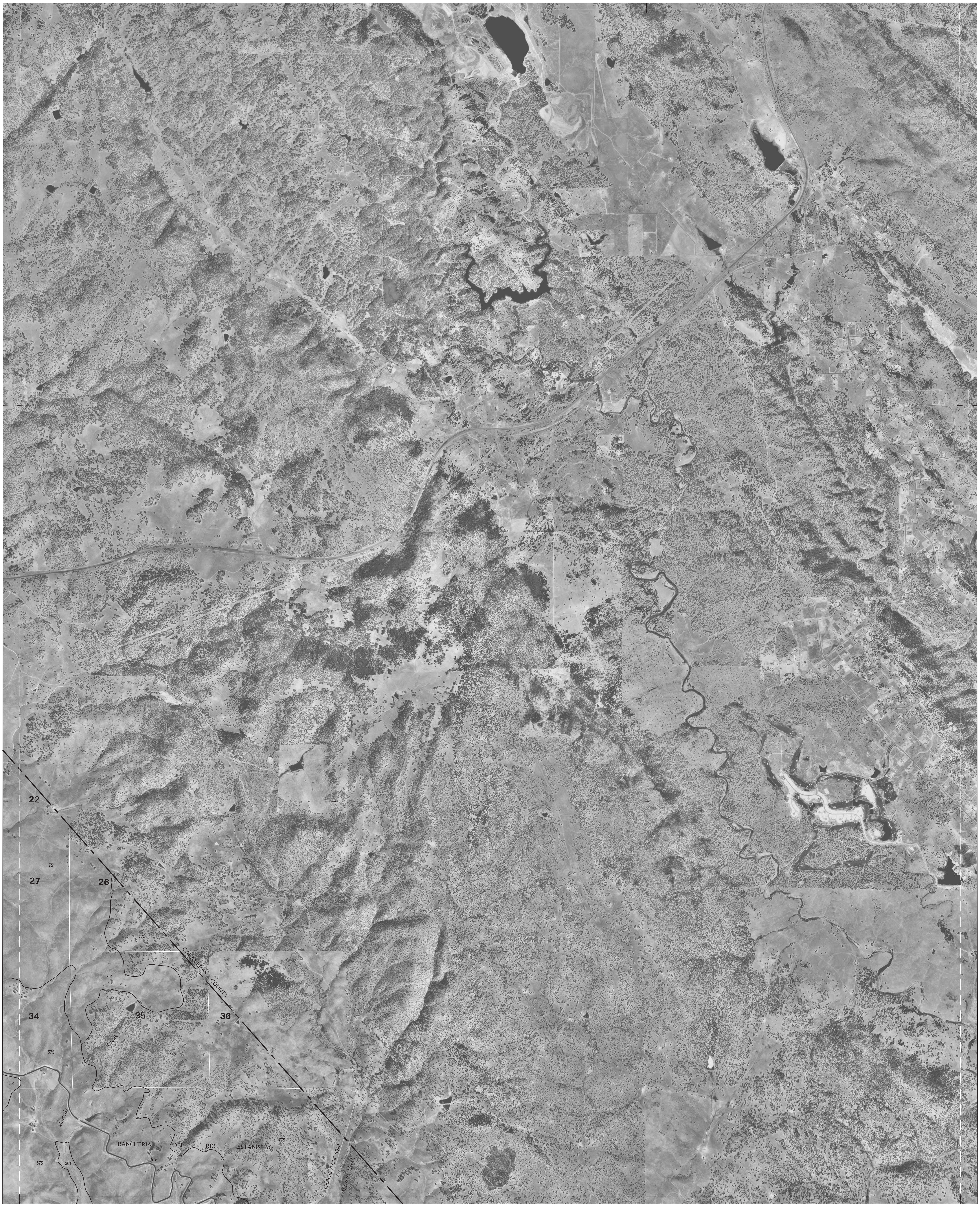
37° 57'30" | 37° 57'30"

Joins sheet 4, Bachelor Valley

37° 55'00" | 37° 55'00"

T. 1 N. T. 1 S. | T. 1 N. T. 1 S.

37° 52'30" | 37° 52'30"



120° 45'00" | 120° 42'30" | R. 11 E. R. 12 E. | 120° 40'00" | 120° 37'30"

Joins sheet 8, Knights Ferry

Joins sheet 7, Oakdale

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

COPPEROPOLIS, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 8

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 3, Farmington

Joins sheet 4, Bachelor Valley

121° 00'00" 120° 57'30" 120° 55'00" 120° 52'30"

R. 9 E. R. 10 E.

37° 52'30" 37° 52'30"

Joins sheet 7, Oakdale

37° 50'00" 37° 50'00"

T. 1 S. T. 2 S. T. 1 S. T. 2 S.

37° 47'30" 37° 47'30"

37° 45'00" 37° 45'00"

121° 00'00" 120° 57'30" 120° 55'00" 120° 52'30"

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

ESCALON, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 8

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 3, Farmington

Joins sheet 4, Bachelor Valley

Joins sheet 5, Copperopolis

120° 52' 30" 120° 50' 00" 120° 47' 30" 120° 45' 00"

R. 10 E. R. 11 E.

37° 52' 30"

Joins sheet 6, Escalon

Joins sheet 8, Knights Ferry

37° 50' 00"

T. 1 S.
T. 2 S.

37° 47' 30"

37° 45' 00"

120° 52' 30" 120° 50' 00" 120° 47' 30" 120° 45' 00"

R. 10 E. R. 11 E.

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1993-1998 aerial photography. Public land survey system (PLSS) was acquired from U.S. Geological Survey.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data is available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

OAKDALE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 8

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 4, Bachelor Valley

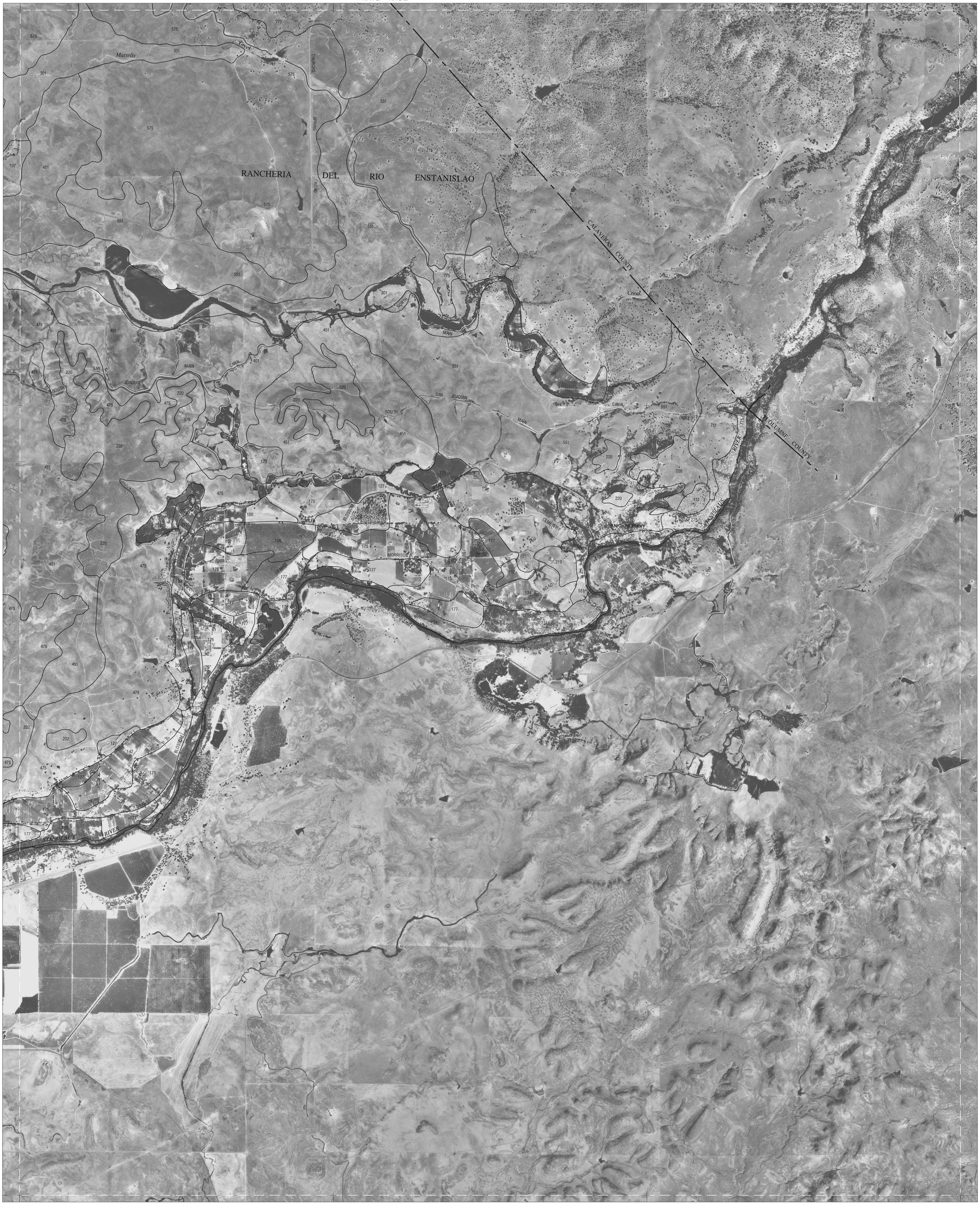
Joins sheet 5, Copperopolis

Joins sheet 7, Oakdale

120° 45′00″ 120° 42′30″ 120° 40′00″ 120° 37′30″

R. 11 E. R. 12 E.

37° 52′30″



37° 50′00″

T. 1 S.
T. 2 S.

37° 47′30″

37° 45′00″

120° 45′00″ 120° 42′30″ 120° 40′00″ 120° 37′30″

R. 11 E. R. 12 E.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

KNIGHTS FERRY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 8

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